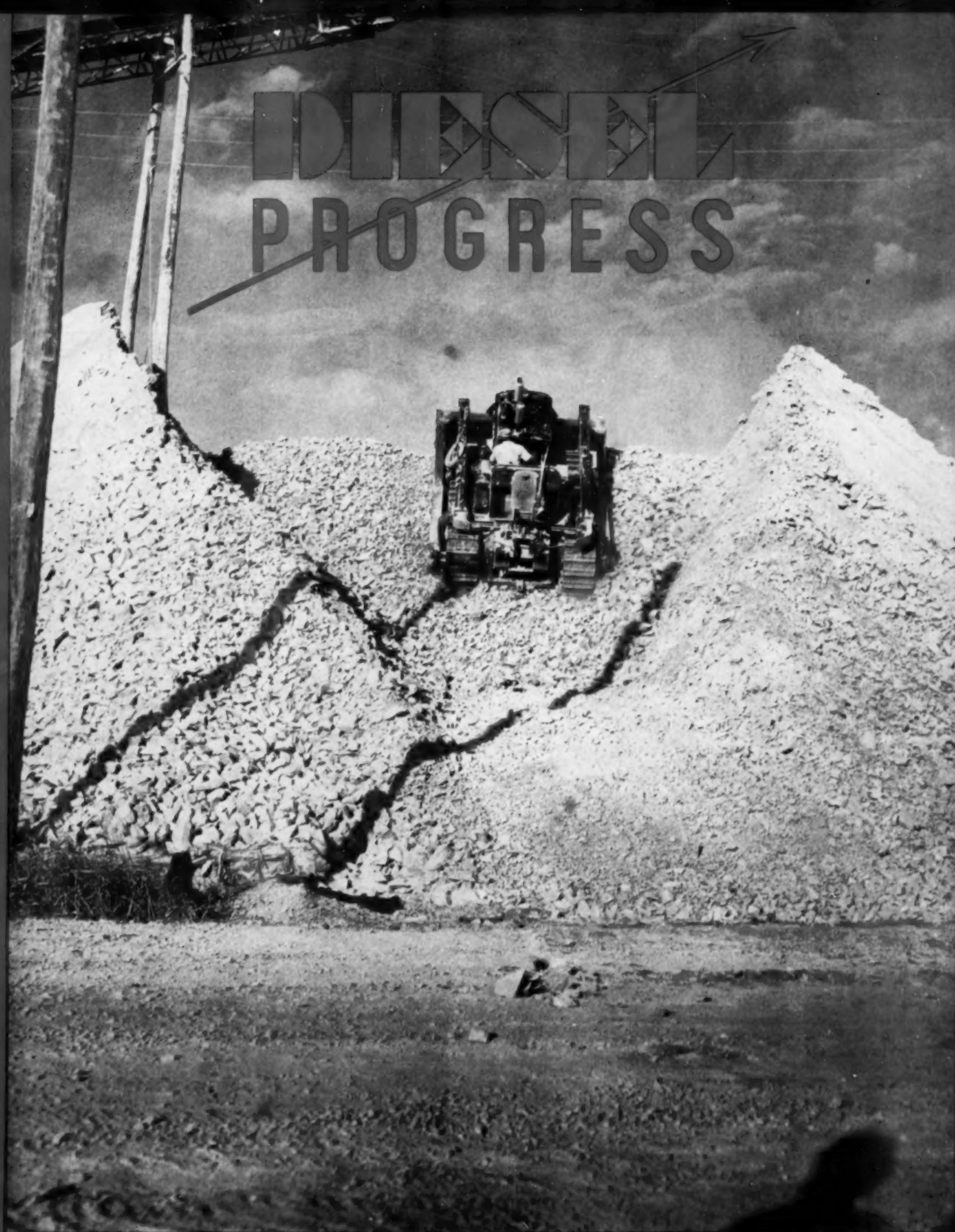


IN INDUSTRY • IN TRANSPORTATION • ON THE SEA • IN THE AIR

DIESEL PROGRESS



FIVE DOLLARS PER YEAR

JULY, 1956

FIFTY CENTS PER COPY

HOW YOU CAN KEEP OUTPUT UP, KWH

LUBRICATE your engines with one of the world-famous *Texaco Ursa Oils*. It's your best assurance of full-power, dependable performance at low maintenance costs.

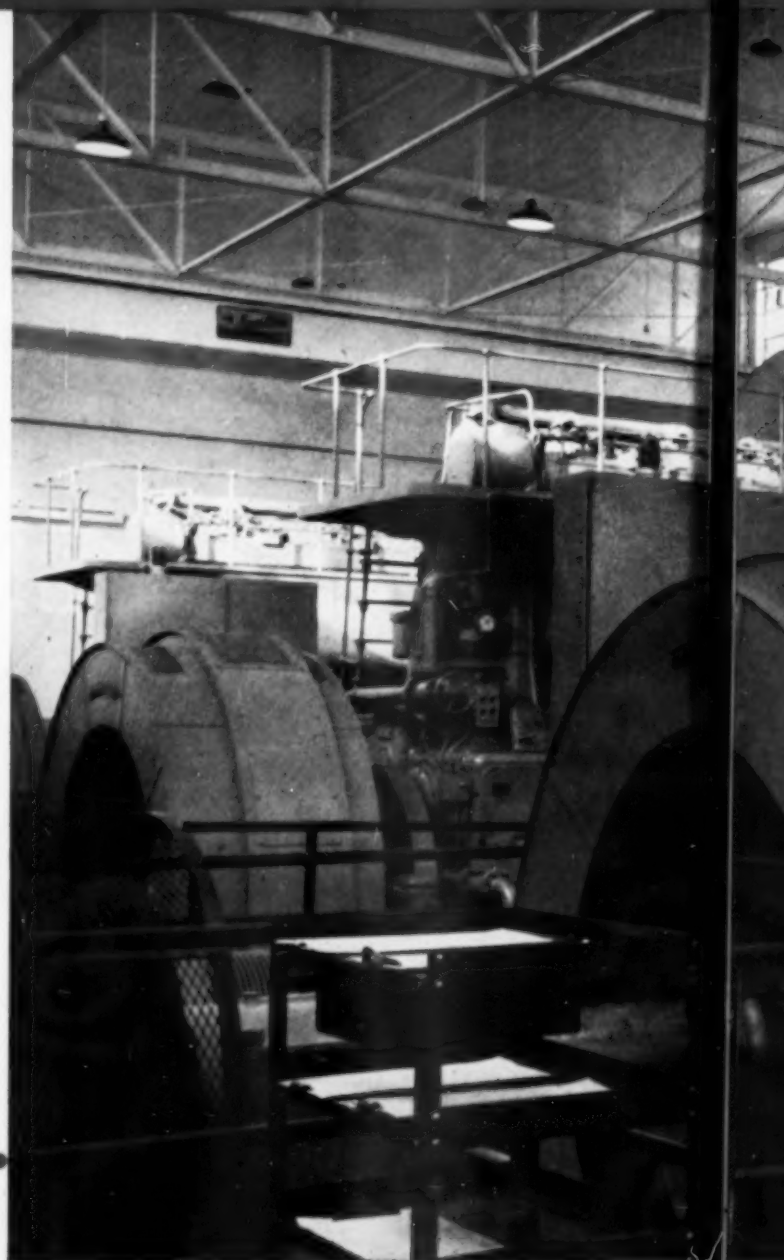
There is a complete line of *Texaco Ursa Oils* — especially refined to make diesel, gas and dual-fuel engines deliver *more power with less fuel over longer periods* between overhauls.

Operators everywhere have found that *Texaco Ursa Oils* prevent harmful deposits and stuck rings, assure proper compression and combustion. These outstanding benefits are so consistently delivered that —

For over 20 years, more stationary diesel h.p. in the U. S. has been lubricated with Texaco than with any other brand.

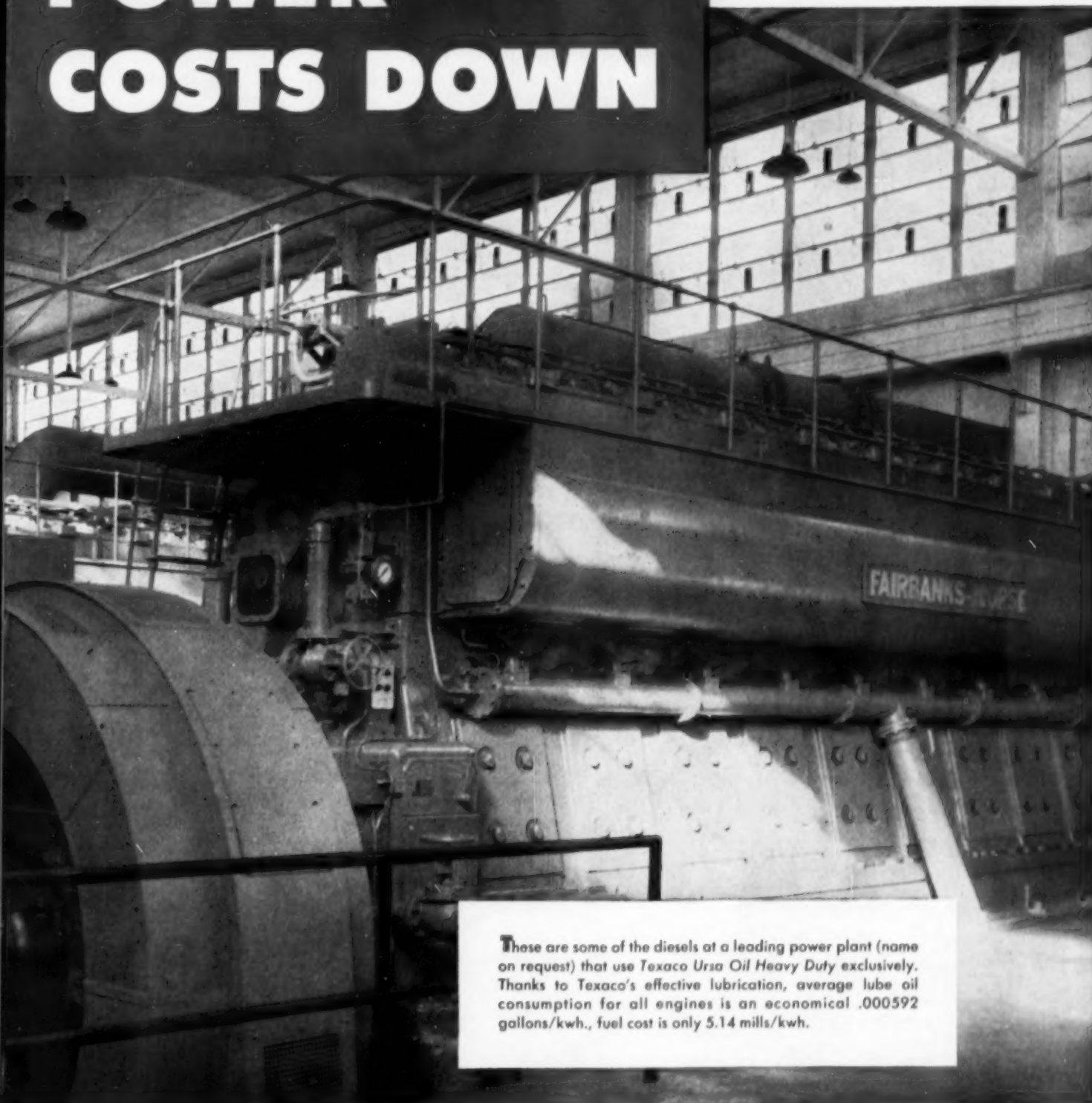
Whatever the type of your engines, whatever the operating conditions—there is a *Texaco Ursa Oil* to assure highest efficiency at lowest possible cost. Let a Texaco Lubrication Engineer help you make the best selection.

Just call the nearest of the more than 2,000 Texaco Distributing Plants in the 48 States, or write The Texas Company, 135 East 42nd Street, New York 17, N. Y.



TEXACO

POWER COSTS DOWN

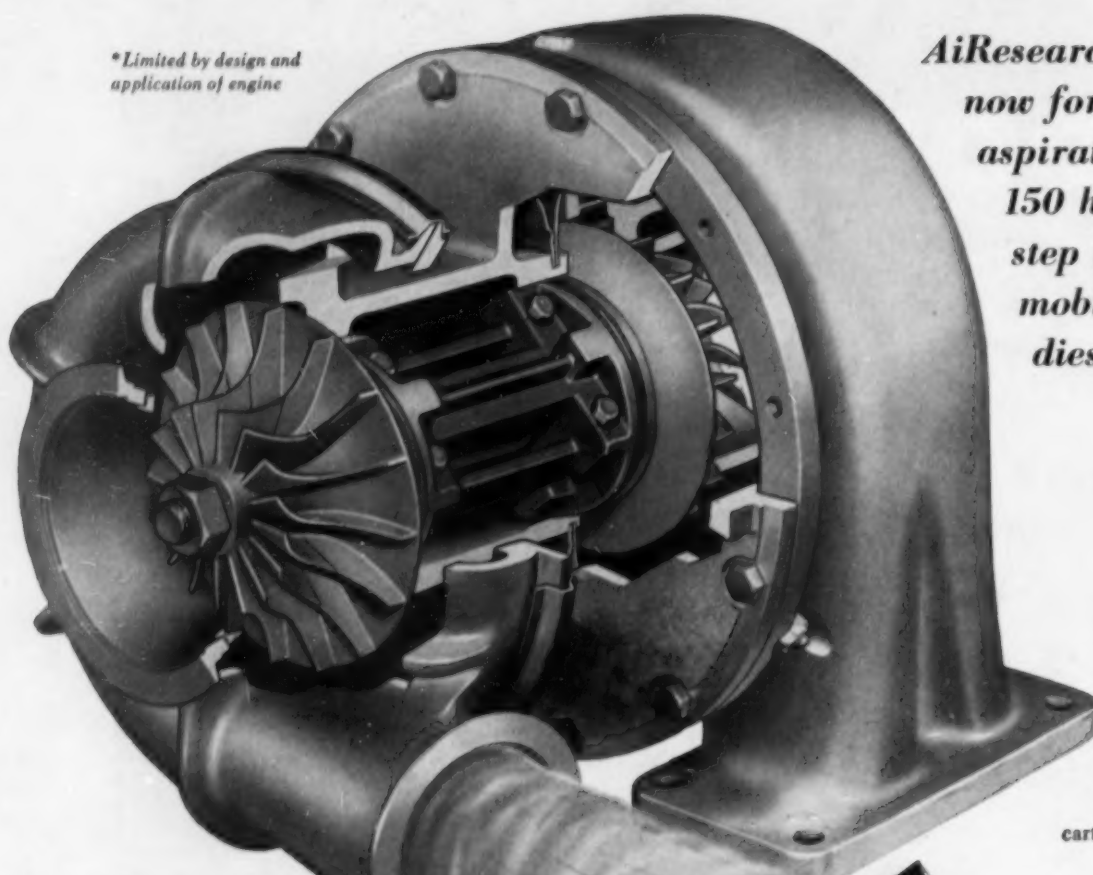


These are some of the diesels at a leading power plant (name on request) that use *Texaco Urso Oil Heavy Duty* exclusively. Thanks to Texaco's effective lubrication, average lube oil consumption for all engines is an economical .000592 gallons/kwh., fuel cost is only 5.14 mills/kwh.

URSA OILS FOR ALL DIESEL, GAS AND DUAL-FUEL ENGINES

AiResearch Turbochargers improve diesel engine performance up to 100%*

**Limited by design and application of engine*



AiResearch units are available now for use with normally aspirated diesel engines of 150 hp and up. They step up performance of both mobile and stationary diesels, land or marine.

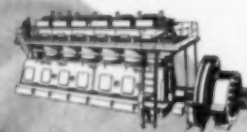


Removable cartridge simplifies repair and overhaul

This cartridge contains the turbocharger's rotating assembly, bearings and seals in a factory balanced package. It can be replaced in minutes with another factory balanced cartridge by a mechanic on the scene.

AiResearch has more experience in the design and manufacture of small turbomachinery than any other company in the world. This experience has led to refinements in AiResearch turbochargers which make them the most efficient and safest units of their kind. New additions to the AiResearch family of turbochargers have widened their range of application in the diesel engine industry.

Our engineers will welcome the opportunity to work with you in improving the performance of your diesel engines. We are happy to confer on possible application of the turbocharger principle to your power plants.



AIRESEARCH TURBOCHARGERS NOW AVAILABLE

MODEL	T-10	T-18	T-16	T-30
Diameter — in. nom.	9	15 1/4	11 1/2	15 1/4
Length — in.	9	16 1/2	15 1/4	17 1/4
Weight — lb.	39	125	100	135
Output — lb/min. (Standard Conditions)	25-40	35-65	45-65	70-95



AiResearch Industrial Division

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DIESEL PROGRESS

DIESEL and GAS ENGINE PROGRESS

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CONTENTS FOR JULY, 1956

Illinois Rural Electric Company.....	25
International Harvester Power Show.....	28
Cleveland Sewage Plant.....	30
New Tracy Tug.....	32
Instruments For Diesels.....	34
Diesel Towboat <i>Arrowhead</i>	37
Making Molehills Out Of Mountains.....	38
Diesel Tug <i>Grampus</i>	40
Woodbine, Iowa.....	42
General Motors Technical Center.....	44
Fluid Drive For Diesels.....	46
Rolling Zeros For Railroads.....	48
Cargo Carrier <i>Inagua Rover</i>	50
What's Going On In England.....	52
Eastern Diesel Observations.....	54
Automotive Diesel Progress.....	56

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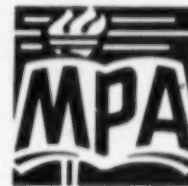


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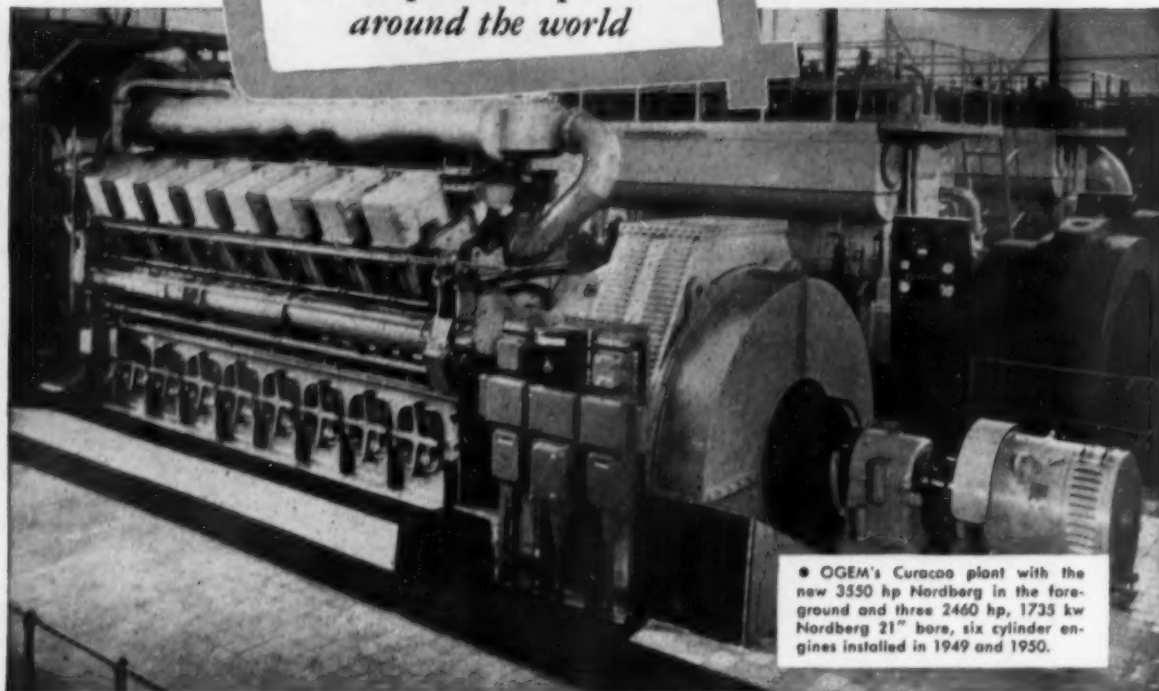
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FRONT COVER ILLUSTRATION

Front end pointed sky-
ward, this International
Harvester TD-18 crawler
tractor, equipped with
bulldozer, is preparing to
level a stock pile in a
quarry owned by the Mad-
ison Limestone Co. of
Monteville, Ala. Photo
courtesy of International
Harvester Co.

*... dependable power
around the world*



Netherlands West Indies Utility installs its 10th NORDBERG DIESEL

Here's evidence again of the reliability of Nordberg Diesels as N. V. Overzeese Gas En Electriciteit Mattschappij of Curacao, Netherlands West Indies places their *tenth* Nordberg engine in operation... a 16 cylinder V-Type *Supairthermal*® Diesel engine rated 3550 hp, 2500 kw at 500 rpm.

Installed at Curacao, the new engine gives this plant a total of 10,930 Nordberg horsepower. Four Nordberg *Supairthermal* engines are also providing 5640 hp at this progressive utility company's Aruba Island plant, and two 2670 hp V-type engines were recently placed in service at the Paramaribo station. *A total of 21,910 Nordberg horsepower!*

When additional power was needed, users like N. V. Overzeese Gas En Electriciteit Mattschappij, *naturally chose Nordberg again.* They have had proof of Nordberg's reliability and low operating and maintenance cost. *It's what they expect of Nordberg Engines!*

Next time you have a power problem, consult Nordberg. Write for further information, outlining your power requirements.



NORDBERG MFG. CO., Milwaukee, Wisconsin



9933

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BUILDERS OF AMERICA'S
LARGEST HEAVY DUTY
ENGINE LINE...
10 to over 12,000 HORSEPOWER



The first comprehensive filtration guide ever edited specifically for designers.

Where are filters used? Why are filters used? How do filters save money? Now for the first time Purolator's new "Filtration Manual for Designers" has all the answers gathered together in one place.

Some typical section headings

- space requirements
- filter costs
- selection of type of element
- deciding flow capacity needed
- economics of filtration
- how Micronic® and metal edge filters are made

"Filtration Manual for Designers" spells out application considerations in detail including degree of

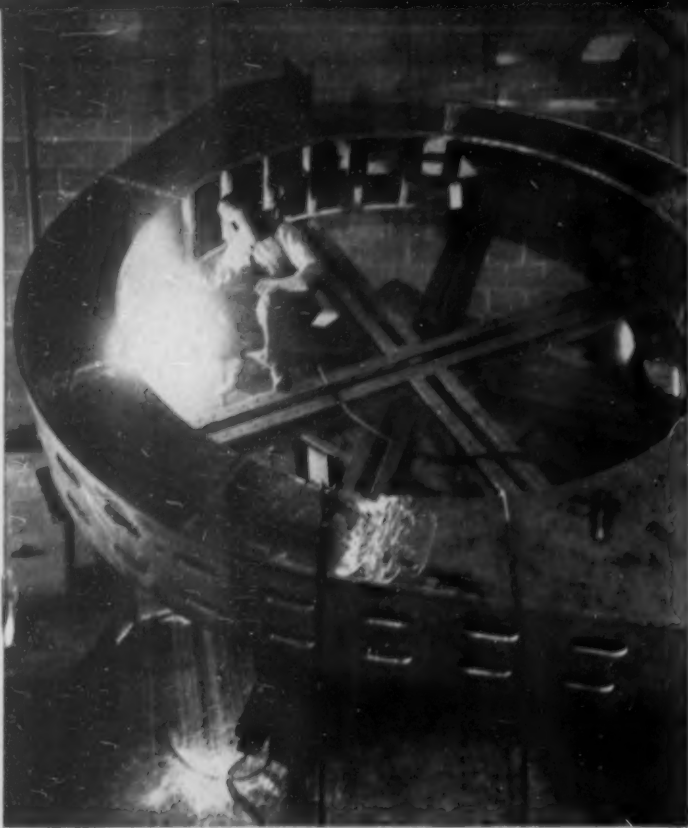
filtration, flow rate, contamination to be removed, viscosity of fluid, plus a complete glossary of terms that apply to filtration. Printing of this manual is limited so please send in coupon for your copy today.

PUROLATOR PRODUCTS, INC.

Dept. DB-710, Rahway, N. J.

Please send my copy of your "Filtration Manual for Designers."
I'm enclosing 25¢ for postage and handling.

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To save you time, we've got it in rhyme!



The

a b c's

of electric generator construction

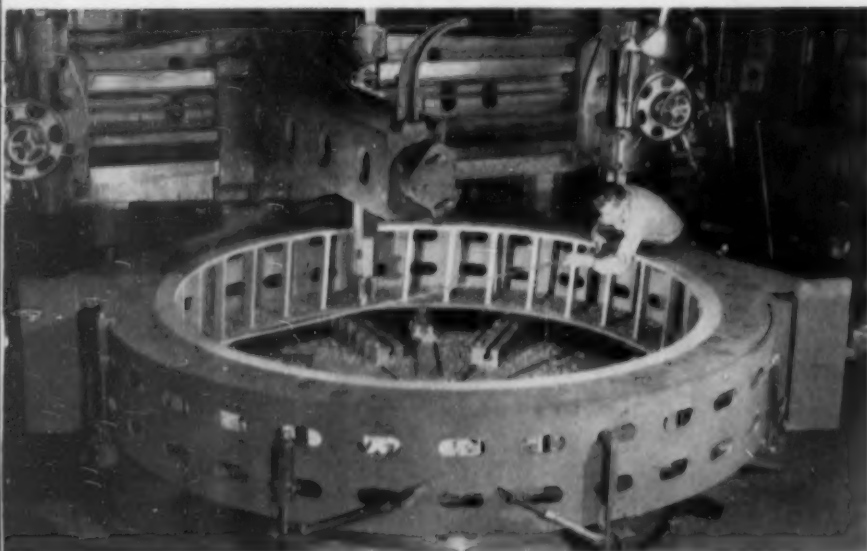
Here's an action picture sequence of a big E-M Custom-Built Synchronous Generator in construction. Step by step, you can observe the meticulous care given to every construction detail by E-M engineers and craftsmen. The little rhymes will call your attention to the key points in each picture.

This particular E-M Generator, built for the Central Kansas Electric Coop., Inc., Great Bend, Kansas, is rated at 4250 kva, 2400/4160 volts, 257 rpm. Your plant's generator requirements may not be this sizeable, but it is a point of pride at E-M that the same careful attention is given to *every* Generator, large or small, which bears the E-M nameplate.

ELECTRIC MACHINERY MFG. COMPANY
MINNEAPOLIS 13, MINNESOTA

a

A's for All-welded, this frame for long duty.
Unique in its strength, a self-contained beauty.
All welding is done before other work starts,
So it's free from distortion as we add other parts.



b

Precise Boring is next on this tough stator frame . . .
The air gap stays uniform, always the same.
The resultant gain is a point to remember—
High quality power from Jan. through December.

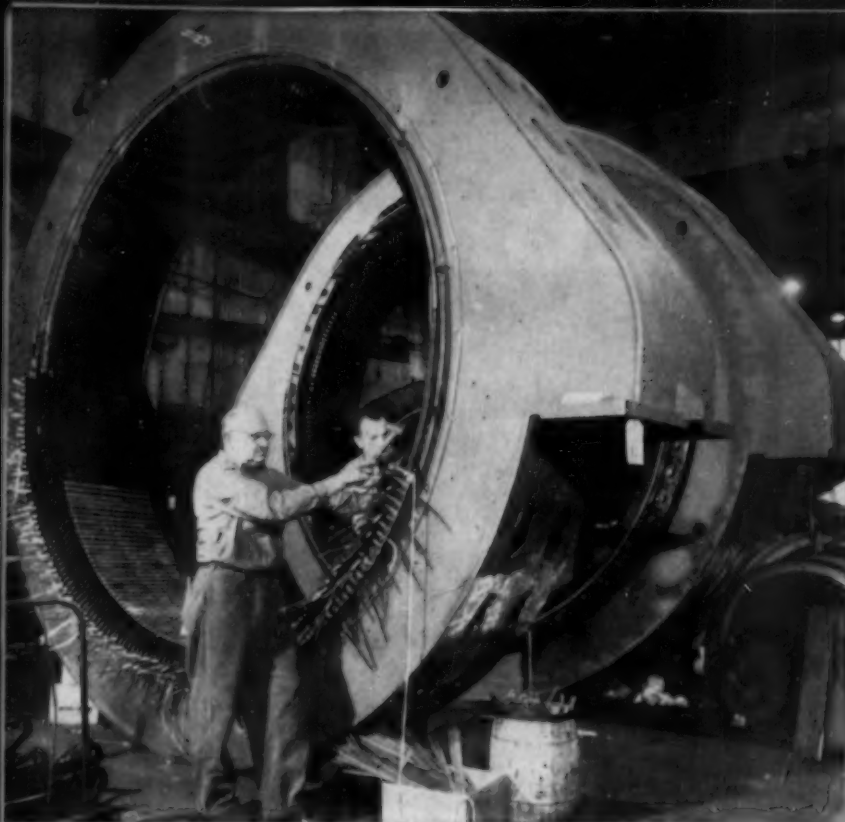
c

Care in Construction means no through-bolts here;
Unified components are strikingly clear.
And dovetailed keys support each lamination . . .
This is convincing strength demonstration!



d

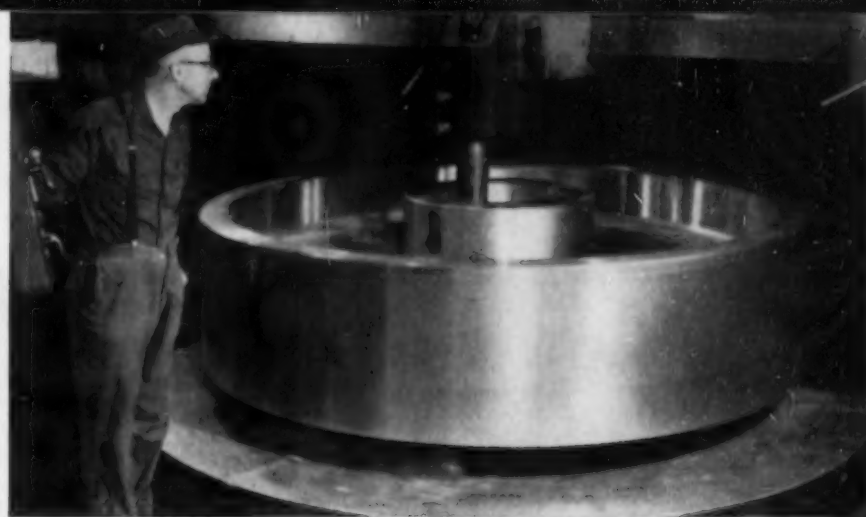
Diligence you'll find in the lamination stacking,
Permanently in place . . . what meticulous packing!
Core slots are "skewed" with strict adherence
To lowest possible 'phone interference.



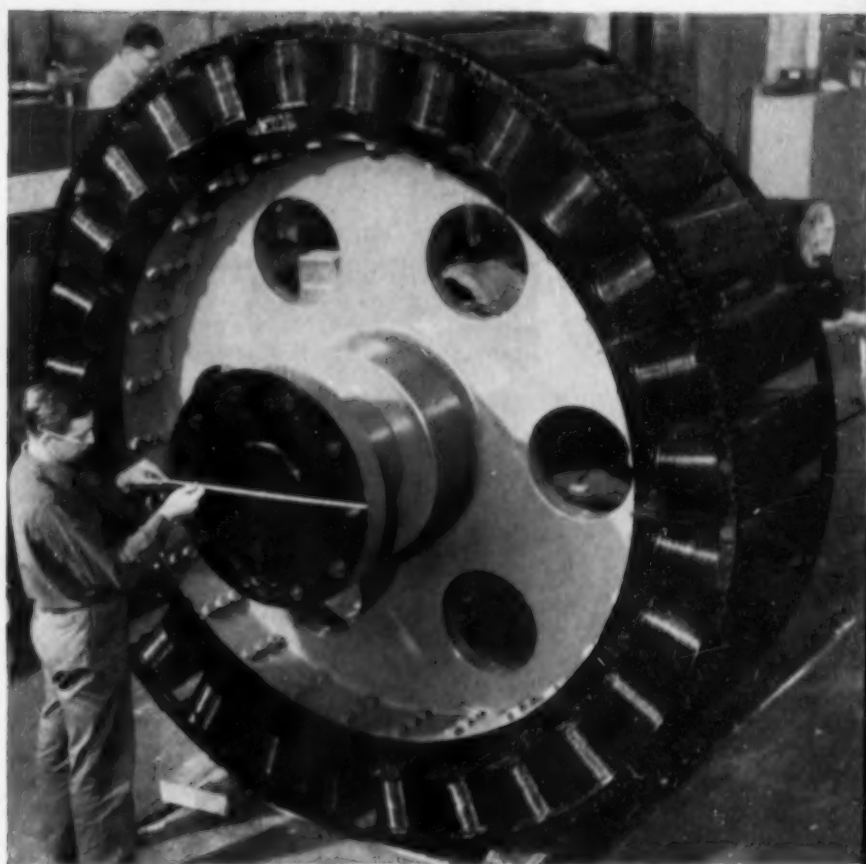
e The winding Excels, like the lashing of coil ends . . .
No wobbles, no weaving, no movements, no bends.
Special lashing makes coils resist urges
To distort from lightning or switching surges.



g Generatorly speaking, even after crystal-gazing
We decided we feature the best method of brazing.
It means better damping, and it's no small sensation
To notice improvement in generator operation.

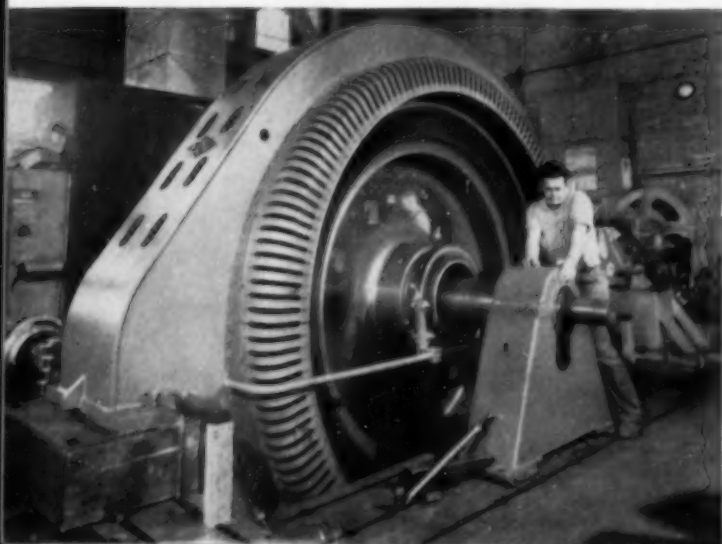


f F is for Flywheel Effect, which increases first-rate
With a cast rotor spider, a true heavy-weight.
And . . . so important in each power station . . .
You get much better parallel operation.



h H is for Handsome . . . the rotor complete.
It's a clean, shining beauty that just can't be beat!
Every part is just right . . . every part will stay tight;
Good news for the user . . . good power . . . good light!

i Inspection is thorough, when we've
done all the rest,
For each E-M
machine stands a
rigorous test.
When it's installed in
your plant, you're assured
it can take it . . .
It's bound to be rugged, for
it had experts to make it!



We suggest, with full confidence, that you contact your
nearest E-M sales engineer when plant modernization or
new plant planning comes up. He knows electric power
generating equipment from A to Z, and can help you
materially in getting dependability and extra value in
equipment.

Also—be sure to write the E-M factory for your free
copy of Publication No. 196, "Your E-M Guide to
Profitable Installations of Modern Generators." Electric
Machinery Mfg. Company, Minneapolis 13, Minnesota.



2200-TFA-2139

SPECIALISTS IN *Custom-Built* GENERATORS



Walter T. Masseck, Supt. of Utilities at Tipp City, Ohio, sets Enterprise "Select-O-Matic" control for Dual Fuel operation.

Dual Fuel? Heavy Fuel? Tipp City, Ohio, Profits From Both With Their Two Modern Enterprise Engines

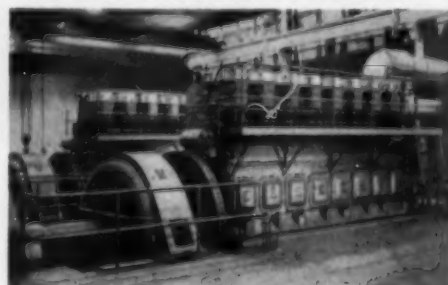
As long as fuel prices fluctuate, and availability of different fuels varies, Enterprise "Select-O-Matic"® Dual Fuel engine systems contribute important savings in power production.

This is the case at Tipp City, Ohio, where they converted their Enterprise Engines from straight diesel operation just two years ago. Dual fuel operation on natural gas and No. 2 diesel pilot fuel is alternated on a seasonal basis, with straight diesel operation using either light or heavy fuel oils, depending on the current market price of the various grades of oil, during the winter months when gas is not available. Gas and heavy fuel operation is economical, and in this business the saving of as little as 1 mill per kilowatt hour amounts to a pretty penny when you're generating 9,488,200 KW hours a year as was the case at Tipp City in 1955.

Let us show you how Enterprise Dual Fuel economy can improve your operations. Write today for full information, or call your nearest Enterprise sales and service office.



The Tipp City Diesel Power Plant is a modern show place. Hundreds of visitors have inspected this efficient, well-run operation where two 1755 HP Enterprise Turbo-charged Engines supply all the power. Dual fuel and heavy fuel systems were installed in 1954, to take full advantage of the less expensive fuels available.



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Export Department, New York



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The Engineer's Field Report

CASE HISTORY

RPM DeLo Oils
LUBRICANTMcGrew Brothers
FIRM Medford, Oregon

Logging trucks work 4 years in mud, dust, and snow without a single bearing failure



FROM LOGGING SHOW TO MILL is a rough 40 miles for McGrew Brothers fleet of B-61 Mack trucks. Four units like one above haul 20-ton payloads through mud, deep dust, or snow, 12 hours a day, five days a week. Mr. E. E. McGrew, partner in the firm, says, "Our trucks take a real beating. But RPM DELO Special Lubricating Oil helps us hold maintenance and replacement costs to a minimum. In the four years we have used this oil, we have never lost a bearing."

"RPM DELO" Special is also used in all other equipment—four pickup trucks, two crew wagons, two water wagons, two loaders, and four Caterpillar-built tractors; three D-8's and a D-7. One of the D-8's went 5,000 hours before

FOR MORE INFORMATION about this or other petroleum products of any kind, or the name of your nearest distributor, write or call any of the companies listed below.



TRADEMARK "RPM DELO" REG. U.S. PAT. OFF.

overhaul and, after inspection, four of original pistons were put back in service. Mr. McGrew designed unique push-arm rig (above), used to unload trucks and stack logs on cold deck.

Why RPM DELO Oils prolong engine life

Special compounds stop corrosion

Anti-oxidant resists lacquer formation

Detergent keeps parts clean



Inhibitor resists foaming

Metal-adhesion qualities keep oil on parts in running or idle engine

STANDARD OIL COMPANY OF CALIFORNIA, San Francisco 20 • STANDARD OIL COMPANY OF TEXAS, El Paso
THE CALIFORNIA OIL COMPANY, Perth Amboy, New Jersey • THE CALIFORNIA COMPANY, Denver 1, Colorado



OFFICIAL UNITED STATES NAVY PHOTOGRAPH
COURTESY OF THE INGALLS SHIPBUILDING CORPORATION

HORSEPOWER GOES TO SEA —

Another Erie Shaft Drives this Navy Ice Breaker

We use the word "another" because we have produced literally thousands of forged steel components for Diesel and Marine use. From raw material to finished product, under one control and with a single responsibility, forged steel cranks, drive shafts, connecting rods, special forgings for processing equipment and a diversity of steel castings for heavy industry are our daily accomplishment. Isn't it quite logical, then, to place your forged and cast steel components requirements with us? We shall welcome opportunities to consult with you.



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CRAWLER TORQUE CONVERTER

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TRUCK-TYPE TORQUE CONVERTER

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MARINE GEAR

DISCONNECTING FLUID PTO

Wherever you find diesel power . . . you find **TWIN DISC!**

In industry today—wherever *diesel* power is applied to driven equipment—you find Twin Disc Friction Clutches or Fluid Drives.

In construction, mining, quarrying and logging, you'll find the biggest crawler tractors driving through Twin Disc Torque Converters . . . power shovels, equipped with either Twin Disc Converters or Fluid Power Take-Offs . . . trucks incorporating Twin Disc Truck-Type Torque Converters . . . and stationary power units, equipped with heavy-duty Twin

Disc Friction Power Take-Offs.

In the oil fields—*throughout the world*—you'll find diesel engines, on drilling rigs, driving through Twin Disc Torque Converters or Model HUD Disconnecting Fluid Power Take-Offs.

Today, Twin Disc is recognized as the world's largest exclusive manufacturer of a complete line of friction and fluid drives—for correctly linking horsepower to industrial powered equipment. Since 1918, Twin Disc *Specialists* have designed and built

friction and fluid drives *for* that one purpose.

If *you* have a power transmission problem—consult the Twin Disc Clutch Company, Racine, Wis., Hydraulic Division, Rockford, Ill.



TWIN DISC CLUTCH COMPANY, Racine, Wisconsin (Hydraulic Division) Rockford, Illinois



ALLIS-CHALMERS ENGINES — 9 to 516 hp
Diesel, gasoline, LP and natural gas
Engines, power units, generating sets

Now...
to meet your needs

MORE

**ALLIS-CHALMERS
ENGINES**

- increased production
- improved standards
- expanded service
- greater parts availability
- more parts interchangeability

The production of Allis-Chalmers engines goes up, up, up to meet your needs. The 1956 production is expected to reach an all-time high — and 1955 output was many percent greater than 1954's. A multi-million-dollar expansion of facilities will further boost production.

But there are not only *more* engines to meet your needs, there are *better* engines — as Allis-Chalmers research and development continues to pioneer improvements, and as production and inspection standards are set even higher.

ALLIS-CHALMERS



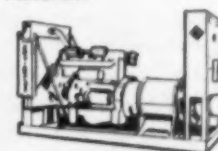
BE-3

Along with this comes an expansion of customer service and greater parts availability, too, as sources of parts and service are moved closer to you.

More and more, it's Allis-Chalmers engines and service to meet your needs.

ALLIS-CHALMERS, BUDA DIVISION, MILWAUKEE 1, WISCONSIN

A complete line of improved engine generator sets from 5 to 300 kw, for emergency and continuous duty, for marine, cooling tower and industrial use.



1954	
1955	
1956 Estimated	

The 1956 production of Allis-Chalmers engines will reach an all-time high, with output many percent higher than in previous years.

DIESEL ENGINE LEADERS CHOOSE FRAM



Manufacturers and engineers who design and build diesel engines prefer FRAM. They know FRAM protection means longer life . . . less wear . . . fewer repairs. To get the most from your diesel, always use the filter manufacturers prefer—get FRAM!

FRAM CORPORATION, Providence 16, R.I. Fram Canada Ltd., Stratford, Ont.

HERE'S THE ROLL CALL OF DIESEL LEADERS WHO USE FRAM AS STANDARD EQUIPMENT

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Inland River Reports

By A. D. Burroughs

THE *Paul Blazer*, active long-favorite towboat on inland rivers, owned by Ashland Oil, took time out from regular duties to be inspected by many hundreds of river folks attending the dedication of the Allied Oil Company's new Gateway River Terminal at Wellsville, Ohio. Built in 1941, this amazing boat receives its 2000 hp from Superior 8 cyl, 14½ x 20 supercharged diesel engines.

A PAIR of Allis-Chalmers supercharged diesel engines each rated at 550 hp, power the new *Shark* launched at Lake Charles, La., by the Calcasieu Shipyard for the Coastal Towing Co., New Orleans. Modern in every design, the tug has crew quarters for 8.

THE FAST *Dixie Spirit*, with her black hull and red-and-white superstructure, was completed recently by Todd Shipyards Corporation for the Dixie Carriers, Inc. Powered by a pair of 500 hp Enterprise engines, this beauty measures 78 x 28 x 6½ ft, designed for intracoastal service as well as inland river duty.

COLEMAN D., the new single-screw all-steel towboat named for the late Coleman Vest, father of the Vest brothers, Carl, Frank, and Otto, is now in action for the Vest Towing Company. Launched in early May, it is equipped with a GM (Cleveland) Model 12-567 engine.

TWIN Atlas diesels will power the new 70-ft tug under construction at the Bollinger Machine Shop and Shipyard, Lockport, La., for a Louisiana owner.

THE *Alex Barker*, a new tug just completed at Bollinger, reported fine service on her trial run from the two Enterprise diesels, rated at 500 hp each. This one will go into service for the Barker Barge Line fleet.

THE Coyle Lines towboat *Mobile* was the first official tow opening the new Algiers Cut-Off Canal, the new outlet into the Mississippi River from the Gulf Intracoastal canal. Equipped with Fairbanks-Morse OP diesel engines for the rated 1170 hp, along with Snow-Nabstedt reduction gears, the *Mobile* has been in active service since completion at the Arnold V. Walker yards in 1954.

WE SAW the *Prairie State* upbound on her maiden trip to St. Paul. A real beauty built by St. Louis Ship for Midwest Towing Company, she gets top power performance from her twin Cooper-Bessemer JS-8-T, 15 x 16, 4 cyl engines, each rated 1200 hp at 450 rpm.

ENTREPRISE engines, Model DMG38,

will power the new 2400 hp towboat now under construction at Dravo for the A. L. Mechling Barge Line, Inc. Yet unnamed, it measures 148 x 24 x 10 ft 6 in., with delivery scheduled for mid-summer.

THE POPULAR 15 year old towboat, the 1000 hp *Albert E. Heekin*, owned by MVBL, had a recent face-lifting, or up-lifting job getting a new retractable

pilothouse for Illinois waterway service. Dependable service power is obtained from the Cooper-Bessemer JS-6 diesels.

THE Maxon-built (Tell City, Ind.) *Stormy II*, a new twin-screw 46 ft towboat getting its 400 hp from two Cummins engines is reported in profitable action for Ohio River service for her owners, the H. L. Seabright Company.

TWO Caterpillar Model D375 engines power the new tug, the *Anna C.*, completed recently at the Bludworth Shipyard. Owned by Capt. J. D. Cayton, this new one was seen in action on the Mississippi for the Upper Mississippi Towing Company.

TOTTY F. McCool, recently purchased from the G. B. Zigler Company,

NASSCO Standardizes on Fairbanks-Morse Opposed-Piston Diesels for New Fleet of Tuna Clippers

More room in the hull ... for bigger pay load

—Why build a tuna clipper to operate at a greater profit, then burden it with excess bulk and weight before it leaves the ways?

—Why sacrifice valuable pay load and supplies capacity for the weight and space of an outsized engine and its accessories?

These were the first questions asked by National Steel and Shipbuilding Corporation before the first keel plate was laid for its fleet of modern tuna clippers. It answered these basic questions by standardizing on the compact six-cylinder, 960 horsepower Fairbanks-Morse Opposed-Piston Marine Diesel. This elimination of excess bulk and weight is one of the reasons why these 127-foot vessels have a 340-ton capacity plus ample sea stores.

The first three of these O-P powered vessels are now proving the added advantages of dependable power, higher speeds and increased maneuverability. Two more clippers on the NASSCO ways will soon provide further proof of the *plus performance* of this modern fleet that has standardized on Fairbanks-Morse Opposed-Piston power.

F-M Motors and Pumps ... have also been specified as standard in the new NASSCO fleet of tuna clippers for top dependable pumping service.

NASSCO standardized on F-M Opposed-Piston Diesel because:

The Opposed-Piston engine is the only marine diesel that offers all the design advantages of:

Two-cycle design

... that eliminates many wearing parts and their attendant adjustment, service and eventual replacement. The O-P presents the ultimate in this respect by eliminating more than 40% of the wearing parts found in engines of comparable horsepower.

Uniflow scavenging

... eliminates crosscurrents and dead pockets ... provides greater horsepower and increased thermal efficiency that give the utmost in fuel oil economy.

Opposed-Pistons

... of equal weight in a single-cylinder liner react to the pressure of combustion at equal speeds in opposite directions. Together with contra-rotating crankshafts, these design features produce an unequaled smoothness of responsive power, practically vibration free.



Jennings, La., by the Tex-Mex Towing Co., Houston, was in Kansas City with a petroleum tow handled neatly by the 1000 hp developed from Superior engines.

WE WERE lucky enough to catch a good glimpse of Norman Hill's new 70 x 20 x 7 ft towboat, the all-steel *Helrich* as she arrived at Greenville, Miss., with a two-

barge tow for her maiden trip. Her performance was rated satisfactory from the three GM engines, each rated at 275 hp.

WHEN we left Greenville, we sighted the mighty *Aetna-Louisville*, owned by Ashland Oil, powered by GM Model 278As, using the 4800 hp for a 27,000 ton load pushing upstream with good time on this big load.

REPORTS from Calumet Shipyard, Chicago, reveal that construction will soon begin on a 2000 hp tug, to measure 85 ft x 23 ft 11½ in. x 11 ft, with power provided by General Motors diesels.

IN ANSWER to the recent Wisconsin letter, the *George R. Gettys II* was built in Knoxville, Tenn., by its owners, Knoxville Sandgravel Co. in 1951. Cummins

diesels provide the rated 275 hp.

AN ORDER has been placed with St. Louis Ship by the Hutchinson Barge Line, Inc., for a 124 x 33 ft twin screw towboat to be named the *Larry Turner*, honoring the Great Lakes Towing Company president. The 1800 hp will be delivered by a pair of GM 12-567 engines.



Latest design from bow to rudder

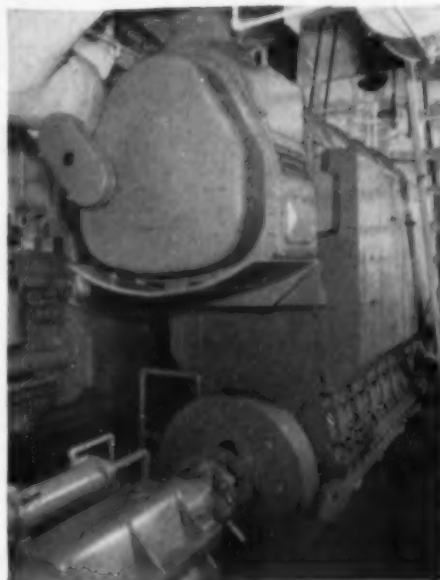
Hull: These new fishermen have an efficient hull form designed as the result of extensive model test studies.

Rudder: The design of rudder features one of the recent high-speed N.A.C.A. airfoil shapes.

Main Engine: The heavy-duty 960 hp. F-M Opposed-Piston Diesel was selected for modern efficiency, reliability and economy.

Behind these exclusive design advantages stands the record established by more than 6,000,000 installed Opposed-Piston horsepower. It proves the reliability . . . economy . . . and efficiency of the Fairbanks-Morse Opposed-Piston Marine Diesel.

Engine-room view of the 960 hp. Model 38D Opposed-Piston Marine Diesel specified as the standard propulsion engine for the new fleet of NASSCO tuna clippers.



Electric Plant Catalog

A new 8 page, 3 color catalog describing the complete line of Onan electric generating plants has just been released by this Minneapolis manufacturer. This new well-illustrated catalog has been carefully designed to make it easy for the reader to select the proper type of generating plant and necessary accessories for his particular needs with a minimum of effort. Laid out in simple two-page spreads, each separate series of Onan electric plants—1 cylinder air-cooled models; 2 cylinder air-cooled models; 4, 6 and 8 cylinder water-cooled models and air-cooled diesel models—are listed in complete detail.

Below each photo spread is a detailed Model Selection Guide, giving model number, description, starting method, type of engine and dimensions and weights of each plant. Optional accessories available for the units listed on each spread are described and pictured. Individual specification sheets for all models and information on Onan's new cooling system are listed as being available. This new 1956 Onan Electric Plant Catalog is available without charge by writing to the manufacturer, D. W. Onan & Sons Inc., Minneapolis 14, Minnesota. Ask for Onan Electric Plant Catalog A-428.

Pamphlet on Diesel Oil

A pamphlet just published by Gulf Oil Corporation-Gulf Oil Refining Company describes the properties of Gulf Diesclube H.D., a detergent type motor oil which is recommended for diesel engines in buses and over-the-road trucks. This product is claimed to combine quality and economy, and to have the proper level of detergency to keep engines clean in the service for which it is recommended. A copy of this pamphlet, No. SP-8694, can be obtained by writing to the company at 1822 Gulf Building, Pittsburgh 30, Pa., or to this magazine.

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PUMPS • SCALES • HOME WATER SERVICE EQUIPMENT • MOWERS • MAGNETOS

Gulf Coast Diesel Notes

By Michael T. Pate

PATTERSON Shrimp Company, Patterson, Louisiana, has secured from Stewart & Stevenson Services, Inc., Houston, Texas, a General Motors model 62203, 6-cylinder diesel rated at 250 hp. The engine is equipped with a 4.5:1 hydraulic reduction and reversing gear and will be installed in the 75 ft wooden shrimp boat *Roshell*.

DYER SMITH, New Iberia, Louisiana, has bought from Waukesha Sales & Service, Inc., Houston, three model 6LRD-BU Waukesha diesels rated 368 hp each at 1100 rpm, for prime drive units on an oilwell drilling rig. He also secured a model 135DKU Waukesha diesel, rated 106 hp at 1800 rpm, to be used for powering a stand-by and a washdown pump.

HARRIS Falgout, Brownsville, Texas, has bought a Stewart & Stevenson model 2GD21 20 kw marine type ac generator, powered by a 2-cylinder series 71, model 2061-A General Motors diesel.

OLIN Mathieson Chemical Company, Houston, has obtained from Big 3 Welding Equipment Company, Houston, two 300 amp Lincoln welding generators, each powered by a series 71, model 2055, 2-cylinder General Motors diesel.

FISCHBACK & Moore, Dallas, Texas, have bought a model 6GD100 automatically regulated Stewart & Stevenson 100 kw ac generator set, equipped with a series 71, 6-cylinder General Motors diesel. The unit will be used at Love Field, Dallas.

SALT Water Controls Company, New Iberia, Louisiana, has purchased from Waukesha Sales & Service, Inc., Houston, two model 190DLBU Waukesha diesels which they will use to power Dos-Oliver desanders. The engines are rated 71 hp at 2200 rpm.

GULF Offshore Fabricating Company, Golden Meadows, Louisiana, has secured from Stewart & Stevenson Services, Inc., Houston, two series 110, model 62203 6-cylinder General Motors diesels, rated 250 hp each, and equipped with 4.5:1 hydraulic reversing and reduction gear, for installation in a 55 ft steel towboat.

HOUSTON Contracting Company, pipeline contractor of Houston, has taken delivery of two 250 amp Lincoln welding generators for delivery to their work at Defiance, Ohio. The generators are powered by model DIX4D 4-cylinder Hercules diesels, rated 40.5 hp each.

OASIS Oil Company, Libya, subsidiary

of Ohio Oil Company, Findlay, Ohio, has taken delivery of eight Stewart & Stevenson model 2GD21 generator sets, each powered by a series 71, 2-cylinder model 2031-A General Motors diesel. The units will be mounted on 4-wheel trailers, two to a trailer, and packed for export.

FOSTER Cathed Company, Wichita

Falls, Texas, has obtained from Waukesha Sales & Service, Inc., Houston, two model 180DLBU Waukesha diesels, each rated 55 hp at 2000 rpm. They will be mounted on the company's oilfield units.

BRAZOSPORT Machine Works, Inc., Freeport, Texas, has bought through Stewart & Stevenson Services, Inc., Houston, two 250 hp series 100, model 62203

6-cylinder General Motors diesels, each equipped with 2:1 hydraulic reduction and reversing gear. They will power the 50 ft steel offshore party boat *Miss Brazosport*.

BETHLEHEM Supply Company, Tulsa, Oklahoma, has bought a Stewart & Stevenson model 2GD21C ac generator set driven by a series 71, model 2030-C Gen-

It's the cleanest, most



Capable of deepest drilling, the Sun Oil Company rig built by Ideco has a 2500 series electric draw works mounted beneath the drilling floor. Flexible Electro-Motive Diesel-Electric Drive makes possible this unique arrangement.



B. H. Hefner, Chief Electrical Engineer of Electro-Motive Division (center), discusses application of GM Diesel-Electric Drive with "Buck" Wilder of Sun Oil Company (left) and W. O. Cook, Vice-President of Ideco.



Newell B. Collins, Electro-Motive Service Engineer, inspects arrangement of drilling platform, where only one motor is mounted to drive rotary table and cathead.

eral Motors diesel. The set is rated 20 kw.

DRILLING & Exploration Company, Houston, has bought for export to Turkey three model 6MKDBU Waukesha diesels, rated 263 hp each at 1100 rpm, and one model 6MKDBSU Waukesha diesel rated 342 hp at 1100 rpm.

CRAWFORD Packing Company, Pala-

cios, Texas, has bought through Stewart & Stevenson Services, Inc., Houston, a series 71, model 6071A, 6-cylinder General Motors diesel. The 165 hp engine has a 3.75:1 hydraulic reduction and reversing gear and will power a 65 ft wooden shrimp boat.

LIBYAN American Oil Company, Houston, has bought a series 71, 2-cylinder

model 2031C General Motors diesel unit, enclosed in steel housing. The unit was equipped by Stewart & Stevenson Services, Inc., Houston.

TRAHAN Drilling Company is having Mid Continent Supply Company, Fort Worth, Texas, equip its new offshore oilwell drilling rig with four model 6-WAKDBU Waukesha diesel engines

rated 180 hp each at 1200 rpm. Three of the diesels will drive generator sets, with the fourth belt-connected to a mud pump.

C. S. THORGUSON, Berwick, Louisiana, has acquired a Stewart & Stevenson model 2GD21 20 kw ac marine type generator set, driven by a series 71, 2-cylinder model 2061-A General Motors diesel.

flexible rig in sight

Sun Oil Company's new Ideco rig with Electro-Motive Diesel-Electric Drive takes the draw works off the drilling floor

Innovation in deep-well drilling rigs is the new unit built for Sun Oil Company by Ideco, one of the Dresser Industries, at its plant in Beaumont, Texas.

Powered by a pair of Electro-Motive SR-8 Diesel-Electric generator sets driving 7 motors, this revolutionary rig offers entirely new standards of flexibility, efficiency and economy.

Only one motor, powering the rotary table and cathead, is mounted on the platform. The Ideco 2500 series electric draw works is located beneath. This design avoids clutter, saves space and makes the rig easier and more economical to move.

Electro-Motive Drilling Rig Power Plants can be used with any drilling equipment operating today. The motors driving draw works, rotary table and mud pumps are connected by flexible cable to the generating units—and the connections can be made by anyone with a simple understanding of house lighting.

But to make doubly sure the equipment is properly used, we instruct your people both on the job and at our Factory Training Center in La Grange.

For further information about this moneysaving Diesel-Electric power, call your nearest Electro-Motive Representative.

Features of Electro-Motive Drilling Rig Power

Completely Integrated Design—Each of the major components designed and built to work together—one manufacturer—one source of service responsibility.

Maximum Portability—All components on skids with weight reduced to a minimum. Units are ruggedly built to withstand handling. No position problem—slashes setup and moving time on land rigs.

Unmatched Flexibility—At a flick of the selector switch on the driller's control panel, power can be selected from one or more generators to meet any power requirement.

Simplified Control—Centralized position of all controls for driller's convenience—continuously variable draw works speed control and complete rotary table torque control at the driller's finger tips.

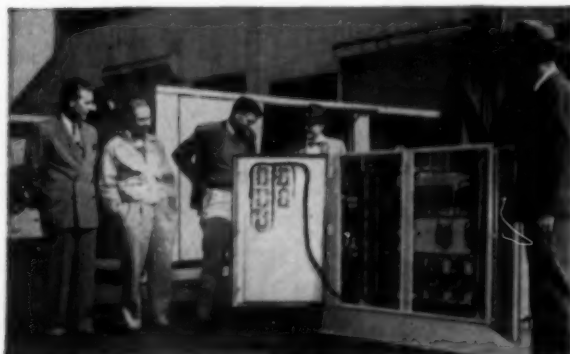
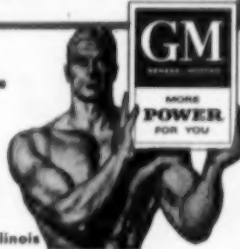
Lower Drilling Costs—Lower first cost and lower cost per well drilled. Smooth electric power—flexible control—means less down time, speeds drilling.

COMPLETE NATIONAL SERVICE AND PARTS AVAILABILITY

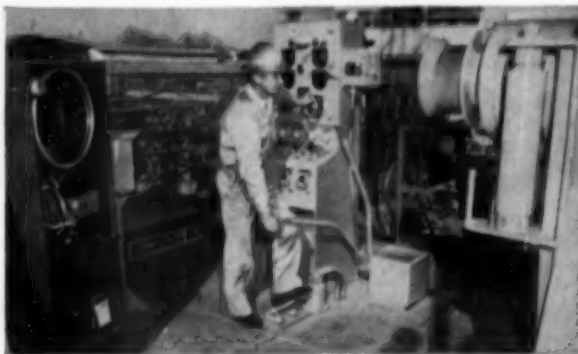
ELECTRO-MOTIVE DIVISION

GENERAL MOTORS • La Grange, Illinois

In Canada: GENERAL MOTORS DIESEL LIMITED, London, Ontario
Petroleum Industry Sales Offices: 1008 Philtower Building, Tulsa, Oklahoma, and 1222 Texas National Bank Building, Houston, Texas



Compact electrical control cabinet utilizes proved components of General Motors Diesel-Electric locomotives. In photo are W. O. Cook, Bert Hefner, Bill Withers, Sun Oil Company, "Buck" Wilder, Sun Oil Company, and A. R. McLerran, Ideco.



Driller's control stand is located on corner of the floor. Control panel carries selector switch, engine speed, mud pump, hoist and rotary table controls, as well as warning lights and safety switches.

LMOA Convention

The Locomotive Maintenance Officers' Association is having its 1956 Annual Meeting at the Sherman Hotel in Chicago on Sept. 10, 11 and 12 and Technical Reports will be given on the following topics at this Meeting: 1. Progress Report on Extending Service Life of Pistons, Rings, Liners and Cylinder Heads; 2.—A Positive Electrical and Mechanical Diesel Maintenance Program; 3.—Diesel Material Reclamation and Control; 4.—Progress Report on Extending the Service Life of Relays and Contactors; 5.—Value of Visual Aid in Personnel Training; 6.—Diesel Water Treatment; 7.—Tools, Jigs and Testing Equipment; 8.—Air Compressor and Gear Case Maintenance.

Boston Transit Bus Order

An order from the Metropolitan Transit Authority of Boston for 50 new buses costing more than \$1,000,000, was announced recently by Mack Trucks, Inc. Robert W. Tyson, Jr., Manager of Mack's Bus Sales Division, said delivery of the new Thermodyne diesel engine buses will begin in the fall. This brings to 95 the number of Mack buses purchased by the Boston system in the past two years.

Extra wide interior aisle space will be featured in the new buses, Mr. Tyson said, as well as exceptionally high head room. The over-all width of the buses will be 102 in. compared with the conventional width of 96 in. Other special features include panoramic windows, pressurized ventilation, power steering and Mack airglide suspension to provide maximum riding comfort. The doors will have a clear-opening of 45 in. instead of the usual 30 in. to provide easier entry and exit.

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Northeastern Diesel Notes

By Arnold B. Newell

THE DONALDSON Towing & Freightage Company of Wilmington, Del., has ordered two 96 ft diesel tugs from the Equitable Equipment Co. of New Orleans, La. Further particulars will be available later.

A SHELTER cabin cruiser built recently as a demonstrator for Diesel Engineering & Equipment Company, Inc. of Woodbridge, N. J., is appropriately named *Deeco*, and powered by a pair of 4-71 GM diesels. Of Jersey Sea Skiff type, shelter cabin model 25 ft 10 in. long 8 ft 10 in. beam and 25 in. draft, cruising speed is 20 mph although a top speed of 25 mph was made on trial trip on Raritan Bay. The purpose of the demonstrations is to show the advantages of the GM diesel drive in smaller marine applications.

A 70 FT SCALLOP dragger has been completed by the Gamage Shipyard of South Bristol, Maine for Frank L. Reiss, Sr., of Provincetown, Mass. The propulsion engine is a 260 hp Enterprise diesel and the 5 kw auxiliary generator is driven by a 1-cylinder Lister engine.

THE GOVERNMENT has ordered ten diesel driven *ice ship* life boats 28 ft long for completion late this year. They are for use on special vessels in the Arctic and are designed with runners on the sides and may be skidded over the ice. Welin Davit & Boat of Perth Amboy, N. J., is building them.

JOHN BLAIR of New York will have two 6-71 General Motors diesels in his new 73 ft yacht recently launched at the Camden Shipbuilding Company yard at Camden, Maine.

CHESTER A. POLING, of New York City, one of the large operators in oil transportation has installed a Caterpillar diesel Model D337 on the oil barge *Princess Bay* for discharge pump operation.

SAYERVILLE, N. J. may be in the market for a new diesel generating plant. It has been stated that the public utility now supplying power, which is resold profitably by the town, is unwilling to renew the contract expiring in a year. The town is unwilling to grant a franchise to the utility and at the same time the near-by town of South River turns in a profit of about \$325,000 per year from its diesel municipal plant out of which it pays better than \$200,000 annually for plant improvement. With a rapid population increase Sayerville needs its own plant.

THE JAMAICA BAY Towing Company of Arverne, Long Island has installed a new Caterpillar Model D375 in the tug *Arlington* operating in local waters.

A 38 ft x 11 ft x 3 ft 4 in. personnel and workboat type of craft was recently commissioned by the Esso Standard Oil Company. Named *Esso Service* this boat is driven by a laid-over 6-71 GM diesel de-

livering 235 hp at 2300 rpm. It will work in the Bayonne, N. J. area.

FOUR 34 ft diesel driven life boats have been ordered for the new Moore McCormick passenger ships. The boats will be built by Welin of Perth Amboy, N. J.

A TWIN-SCREW installation of Caterpillar D-342 diesels has been made in

the Greenport Ice Company's vessel *Irving H* of Greenport, L. I.

A 55 ft trawler, the *Golden Dawn*, has been delivered to Philip Bodoni of Gloucester, Mass. by the Morehead City (N.C.) Shipbuilding Corp. The propulsion engine is a General Motors, Detroit Division, Model 6-110 with 3.75:1 reduction gear driving a 42 x 38 in. Colum-



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For "original maker" quality service on your diesel fuel injection equipment—just get in touch with your nearest official American Bosch service station (see list at right). Here factory-trained experts will give you prompt, efficient service, using specially designed tools and test equipment plus genuine American Bosch replacement parts. It all adds up to fast, accurate repair work that will save you time and money and keep your diesels on the go.

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Orlan
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Atlan
Cairo
Black
Boise
Lewis
Twin
Chica
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Grinn
Saline
Wichi
Louis
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Paduc
Baton
Bosch
Morg
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bian propeller wheel.

A CONTRACT has been placed with the American Bridge Division of the U.S. Steel Corp. at Orange, Texas for the building of a portable, submersible, self-stabilizing elevated-deck drilling vessel for Trahan Exploration, Inc. of New Orleans. The vessel was designed in accordance with the principles developed

by the naval architects, Fried & Goldman of New Orleans who have designed eight other units for off-shore drilling. The new one will operate in 50 ft of water. The vessel is 180 ft long, 136 ft wide, 12 ft depth of hull and 66 ft high from keel to under side of lower deck. Vessels of this type are always heavily powered by diesels. This one will be to ABS class and up to regulations of the

U.S. Coast Guard although not inspected nor certified. It will be documented and measured by the Bureau of Customs.

THE H. A. Smith Company of Baltimore, Maryland has purchased a 150 hp Cummins diesel for installation in a Link Belt shovel, Model K-42 from the local office of the Cummins Engine Company.

THE 60 ft single screw *Steelfin*, built by Blount Marine Corporation of Warren, R. I., has been sold and delivered by the builders to Offshore Boat Rental Service of New Orleans, La. The owners will convert to twin-screw propulsion before placing the new vessel in service.

THE PHILADELPHIA Engineer Corps. has called for bids for a 20 in. diesel-electric suction dredge to be delivered at Manila Bay in the Philippine Islands.

A 600 hp Cummins diesel Model VT-12-1 driving a 300 kw Delco generator has been purchased by the McFarland Construction Company of Toronto, Canada for use in an asphalt plant. Rissel-Hipwell Engines, Ltd. of Owen Sound, Ontario made the sale. They also sold a VT-12-1 to Ashburns, Ltd. for powering a 108 ft schooner.

TWO NEW ferryboats for the Halifax-Dartmouth Ferry Company will be powered with two 300 hp Cummins NRT-6-M diesels each. The four engines were sold by the Cummins distributors for Halifax and Nova Scotia, Russell-Hipwell Engines, Ltd.

THE F. O. Day Bituminous Co. of Rockville, Maryland has re-powered a 22B Bucyrus Erie crane with a model J6B-1 Cummins diesel rated 175 hp.

A MODEL 1005 Kochring Crane owned by the Dryer Structural Steel Co., has been re-powered with a Cummins 300 hp diesel supplied by Cummins Diesel Sales Corp. of Bronx, N. Y.

GENERAL Crushed Stone Company of Fayetteville, N. Y. recently purchased a 110 hp Cummins diesel Model HRCIP-400 for installation in a Link Belt Speeder shovel. Cummins Diesel Central New York, Inc. supplied the engine.

THE SAWMILL owned by Leon Burgeon of Lewis, New York will be powered with a new 165 hp HRCIP-600 Cummins diesel sold by Cummins Diesel Sales Corp. of Albany, who supplied another diesel of the same model for a sawmill owned by Champlain Forest Industry of Essex, N. Y.

A STAUFFER feed mixer is being powered with a 110 hp Cummins diesel by Charlie Elder of Bakersville, Va. Cummins Diesel of Virginia made sale.

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Tucson Auto Plane Electrical Service
Yuma Yuma Automotive Electric

ARKANSAS
N. Little Rock Womack Bros. & Taylor

CALIFORNIA
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El Centro Valley Automotive & Diesel Serv. Co.
Eureka Gustafson Diesel & Electric
Fresno Winther Bros.
Los Angeles Diesel Precision Company, Inc.
Los Angeles, 21 Magneto Sales & Service Co., Inc.
Oakland Diesel Injection & Governor Serv., Inc.
Oakland Pimental & Son
Sacramento Diesel Pump & Injector Service
Sacramento, 6 Langer & Rifkin
Salinas Hag Diesel & Electric
San Bernardino Diesel Injection Service
San Diego Electric Diesel & Equipment Co.
San Francisco, 24 McKinley Corporation of California
South Gate Diesel Fuel Injection Lab.
Wilmington Diesel Control Corp.

COLORADO
Denver, 3 Central Auto Electric Company

CONNECTICUT
Hartford W. J. Connell Co. of Hartford

DISTRICT OF COLUMBIA
Washington Diesel & Ignition Service Inc.

FLORIDA
Jacksonville Diesel Electric Service, Inc.
Jacksonville Patten Sales Co., Inc.
Miami Dade Diesel Company
Miami, 36 Florida Diesel Service Co.
Orlando Interstate Diesel Service
Tampa Stuart Diesel Service

GEORGIA
Atlanta, 3 Auto Electric & Magneto Co.
Cairo Grady Motors

IDAHO
Blackfoot Auto Parts Service Co.
Boise Magneto & Diesel Supply Co.
Lewiston Osterman Diesel & Electric Co.
Twin Falls Diesel Pump & Injector Service

ILLINOIS
Chicago, 18 Illinois Auto Electric Co.
Mendota Walzer's Diesel Service
Peoria Automotive Ignition Co.
Rock Island Lohse Automotive Service

INDIANA
Indianapolis, 4 Gulling Auto Electric Inc.
Montone Smith Brothers Garage
Valparaiso Diesel Service Company

IOWA
Des Moines Electrical Service & Sales Co.
Marshalltown Heuer Equipment

KANSAS
Garden City Bell Diesel Injection Service
Great Bend Bell Engine Service
Grinnell Grinnell Electric & Diesel Service Co.
Salina The Motor Service Company
Wichita, 2 E. S. Cowie Electric Co.

KENTUCKY
Louisville Diesel Injection Service
Louisville Schaff Auto Electric Co.
Paducah Story Electric & Battery Co.

LOUISIANA
Baton Rouge Womack Bros. Diesel Service
Bossier City Vaughan Tractor & Auto Parts Co.
Morgan City Landry's Diesel Injector Service
New Orleans Gerhardt's Inc.
New Orleans, 13 John M. Walton, Inc.

MAINE
Portland Eastern Diesel Service Co.
Portland, 5 Portland Tractor Co., Inc.

MARYLAND
Baltimore, 1 Parks and Hull Automotive Corp.
Baltimore Stephen Seth & Co.

MASSACHUSETTS
Boston Boston Fuel Injection & Engine Service
Boston, 64 W. J. Connell Company
Boston, 10 Wharf Machine & Electric Co., Inc.
Fairhaven Hathaway Machinery Co., Inc.
Springfield C. A. Krohn & Sons

MICHIGAN
Detroit Knorr-Maynard, Inc.
Lansing Diesel Equipment Sales & Service

MINNESOTA
Hibbing Diesel Service Company
Minneapolis Diesel Service Company

MISSISSIPPI
Jackson Womack Brothers

MISSOURI
Kansas City, 8 Electrical & Magneto Service Co.
St. Louis, 23 Diesel Fuel Injection Service Co.
St. Louis, 3 Electric Parts and Service Co.

MONTANA
Billings Original Equipment, Inc.
Havre Midwest Diesel Injection Sales & Service

NEBRASKA
McCook Automotive Sales & Service
Omaha, 2 Carl A. Anderson, Inc.

NEW JERSEY
Newark, 2 Tire Trading Company, Inc.
Somerville Battery & Electric Service Co.
Trenton, 3 Steiner Diesel Injection Service

NEW MEXICO
Albuquerque Central Auto Electric Company

NEW YORK
Brooklyn A & D Diesel Service, Inc.
Buffalo, 5 Hettrich Electric Service
Hempstead, L. I. A & D Diesel Service, Inc.
Pelham Manor Coretti-Gross, Inc.
Rochester Union Carburetor & Ignition Service
Troy Ehrlich Electric Service, Inc.
Utica Stiefvater Electric Co., Inc.
Woodside, 77 American Bosch Div. American Bosch Arms Corp.

NORTH CAROLINA
Charlotte Carolina Rim & Wheel Co.
Raleigh Diesel Injection Sales & Service

NORTH DAKOTA
Fargo Northwestern Diesel Service Co.
Minot Diesel Service Company
Williston Crighton Motor Co.

OHIO
Akron Standard Motor Parts
Cincinnati Tri-State Distributing Corp.
Cleveland, 14 The Cleveland Ignition Co.
Columbus, 15 Columbus Ignition Co.
Lisbon Lisbon Diesel & Supply Co., Inc.
Sidney Hoover Body & Diesel Service Co.

OKLAHOMA
Oklahoma City, 2 American Electric-Ignition Co.
Tulsa Magneto Ignition Company

OREGON
Klamath Falls Specialized Service Co.
Pendleton Eds Magneto & Diesel Co.
Portland, 14 Automotive Products, Inc.
Roseburg Diesel Injection Service

PENNSYLVANIA
Harrisburg Penn Diesel Service Co.
Hazleton Penn Diesel Service Co.
Mt. Carmel Gangler's Diesel Service & Sales
Philadelphia North American Diesel Injection Co.
Philadelphia Sullivan Brothers
Phillipsburg Keystone Diesel Inj. Service
Pittsburgh, 6 Automotive Ignition Co., Inc.

(List of foreign service stations available on request)

SOUTH CAROLINA
Charleston Diesel Fuel Injection Service
Columbia Boney Diesel Works Co., Inc.

SOUTH DAKOTA
Lemmon Josund Auto Electric
Rapid City Hosheth Auto Electric
Sioux Falls Reinhard Brothers Company

TENNESSEE
Knoxville, 15 Diesel-Magneto Service Co.
Memphis, 4 Automotive Elec. Service Co.
Nashville Precision Parts Corp.

TEXAS
Beaumont Diesel Engine & Pump Co.
Dallas, 1 Beard & Stone Electric Co., Inc.
El Paso Reynolds Batt. & Mag. Co.
Houston, 1 Beard & Stone Electric Co., Inc.
Houston Diesel Pump & Injector Service
Houston Magneto & Diesel Injector Service
Odessa Electric Service & Supply
Pampa Radcliff Bros. Elec. Co.
San Antonio S. X. Callahan
San Antonio Womack Bros.

UTAH
Salt Lake City Diesel Electric Service & Supply Co.
Salt Lake City Midwest Service & Supply Co.

VIRGINIA
Norfolk Diesel Injection Sales and Service
Richmond C. H. Woodward Electric Co., Inc.
Salem Diesel Injection Sales & Service

WASHINGTON
Seattle Segittie Injector & Electric Co.
Spokane Spokane Diesel & Electric Co.
Spokane Sunset Electric Co.
Walla Walla Walla Motor Supply, Inc.
Yakima Diesel & Electric Service Co.

WEST VIRGINIA
Charleston Mountain Service

WISCONSIN
Milwaukee Fuel Injection & Electric Company

WYOMING
Casper Cutter Battery & Electric Company
Mills Diesel Service Company

ALASKA
Anchorage Automotive Diesel Electric Supply & Overhaul
Juneau Van's Diesel Service

CANADA
Calgary, Alta. Hutton's, Ltd.
Edmonton, Alta. Smith Battery & Auto Electric
Fredericton, N.B. Stairs Bros. Fuel Injection Service Station

London, Ont. Universal Ignition & Battery Ltd.
Montreal, Que. International Electric Co., Ltd.
Montreal, Que. Northam Equipment, Ltd.
Ottawa, Ont. Welch & Johnston, Ltd.

Peterborough, Ont. A. C. Curtis, Ltd.
Quebec, Que. Quebec Gas & Diesel Engines, Ltd.
Regina, Sask. Electric Motor Service

St. John's (Newfoundland) A. H. Murray & Co., Ltd.
Saskatoon, Sask. Lambert Electric, Ltd.
Toronto, Ont. A. Cross & Co., Ltd.
Toronto, Ont. Auto Electric Service Co., Ltd.
Toronto, Ont. Westway Auto Electric Ltd.

Vancouver, B. C. Fred Holmes Fuel Inj. Sales & Service Ltd.
Vancouver, B. C. Jeffrey & Jeffrey, Ltd.
Vancouver, B. C. Vivian Diesels & Munitions, Ltd.
Winnipeg, Man. Brown & Murray, Ltd.

HAWAII
Honolulu Iron Works Company
Honolulu Kawaihau Ltd.
Honolulu Todoki Machine & Marine Works

PUERTO RICO
San Juan General Farm Equipment Co.

4095

West Coast News

By James Joseph

SAN Mateo, Calif.'s Ets-Hokin & Calvin Co. has taken delivery on a Fairbanks-Morse model 49B4½.

FOR Western Transportation Co., a 600 hp model VT-12-M Cummins diesel engine for installation in a tug boat. Sale via Cummins Diesel Sales of Oregon (Portland).

FOR Bob Egelkrout's 34-ft gillnetter, a GM model 4-51, 43200 marine propulsion unit. Sale via Seattle's Evans Engine and Equipment Co., Inc.

A GM 6-110, 62203, 300 max. hp and 220 continuous engine has gone into Louie Salvesen's 55-ft dragger *Guide*.

A SIMILAR GM 6-110 has been recently installed in the 70-ft purse seiner *Pacific Raider*, operating the Seattle area.

ANDERSON-BEVIER Co., Inc., Los Angeles, announces sale of an Allis-Chalmers (Buda) model DA-970 engine to Salyers Equipment Co. (Los Angeles) for hook-up to a generator.

FOR Honolulu's P. S. Pell & Co., Ltd., a Fairbanks-Morse 45B, 5¼ hp engine, sale confirmed by F-M's diesel division manager, C. E. Dietle.

INSTALLED in Paul Anderson's 22-ft cruiser, a GM model 4-51, 43200 marine propulsion unit. Craft operates in Seattle area.

TO Commercial Ship Repair Division of Pacific Car & Foundry, Seattle, 17 20 hp diesel pumping units (Model 48), the engines by Fairbanks-Morse.

REPOWERING Island Tug & Barge Co.'s *Island Commander*, operating the Pacific Northwest, is a 1200 hp, 8 cylinder, 16 in. x 20½ in. Model Z8S Union diesel engine.

FOR Establishments Emile A. Martins, Papette, Tahiti, a Fairbanks-Morse Model 32E14, 6 cylinder, 450 hp diesel engine.

TO Dana Z. Slater, Martinez, Calif., a Fairbanks-Morse generating set, Model 45B, 5¼ hp.

UNION Diesel is currently building a 1000 hp, 8 cylinder 12 in. x 15 in. propulsion engine for the State of California's new ferry to operate between Martinez and Benicia. Ferry's being built by Alameda's Pacific Coast Engineering Co.

TWO Model 38D8½, 6 cylinder, 960 hp

marine diesel engines—Fairbanks-Morse—have gone to San Diego's National Steel & Shipbuilding Co.

TO Los Angeles' Leich Sales Corp., two Fairbanks-Morse Model 49B4½, 6 cylinder, 180 hp diesel engines.

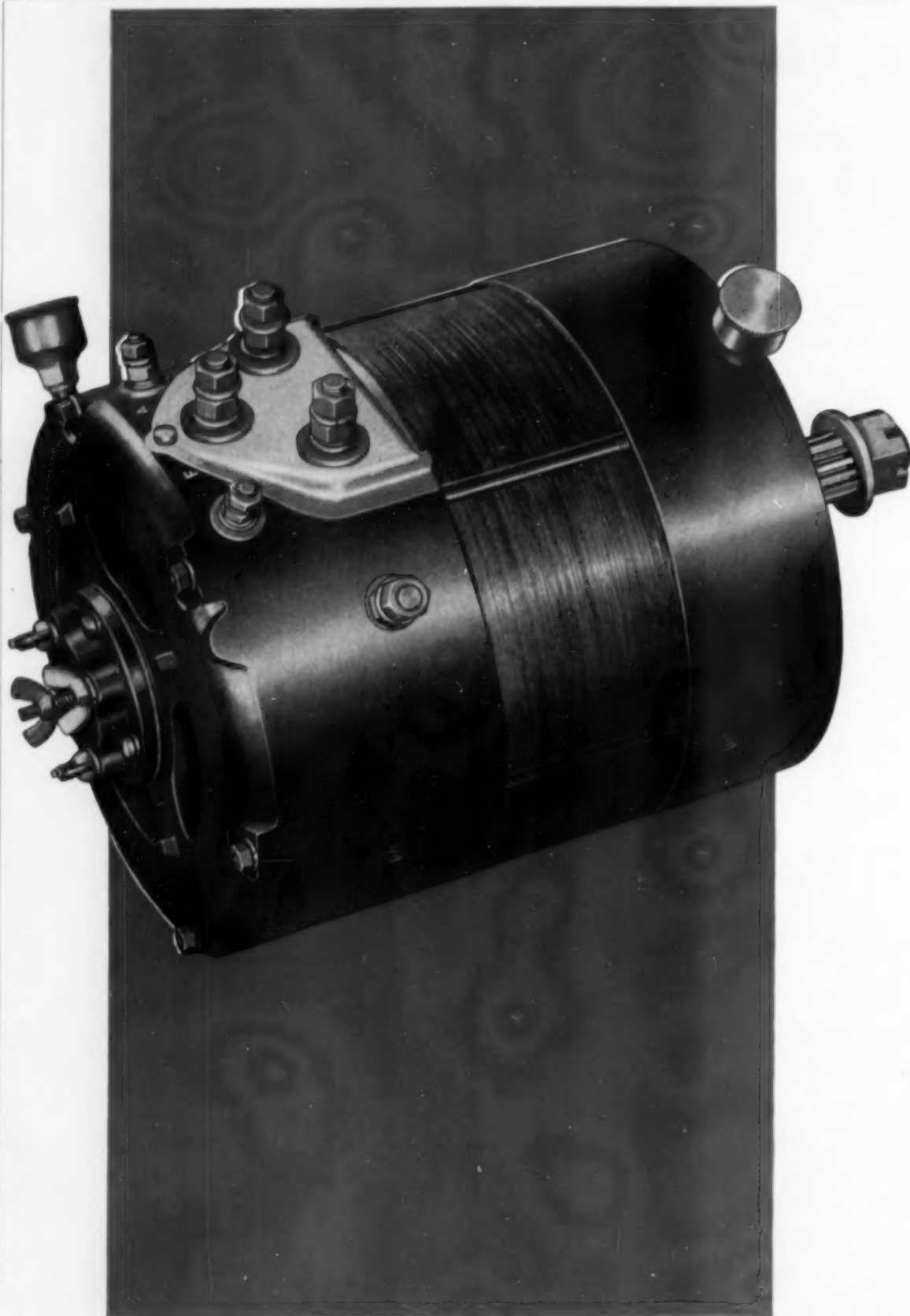
KOTZEBUE, Alaska's, Kotzebue Electric Association has taken delivery of

two Fairbanks-Morse model 38F5¼, 4 cylinder, 300 hp diesel generator sets.

Joins German Company

Robert Bosch GmbH of Stuttgart, Germany, has announced the appointment of Foster N. Perry of Suffield, Conn., as its special representative in the United States, to be concerned with all aspects

of the development of Robert Bosch's American interests. His work will include cooperation with the Company's subsidiary in this country, the Robert Bosch Corporation of New York City. Mr. Perry was associated until recently with American Bosch of Springfield, Mass., whom he served in various capacities for 32 years, the last 15 as a Vice-President, the last 5 as Executive V.P.



Robert Bosch GmbH, known in the United States since 1906, is one of the world's largest manufacturers of fuel injection equipment, both diesel and gasoline, and of automotive electrical equipment, also electrical tools. Through subsidiary companies it is engaged in the manufacture of motion picture cameras and projector equipment, gas heaters, radio and television sets and other elec-

tronic devices. It is currently employing in Germany over 40,000 people.

Flexible Couplings Bulletin

A new four-page bulletin describing standard and special miniature couplings for power transmission is available from Thomas Flexible Coupling Company, Warren, Pennsylvania. This bulletin,

called MC-100, pictures, describes and shows dimensional drawings of miniaturized couplings which can be used on servo-mechanisms, computers, and other small devices. Thomas Miniature Couplings are designed for speeds up to 50,000 rpm and will compensate for parallel and angular misalignment while relieving bearing loads, holding constant torque and synchronism. The Thomas

miniature couplings are non-magnetic, torsionally rigid, inertially low and light weight. They require no lubrication and no maintenance because there are no wearing parts. Material specifications, dimensions, bore size, and list prices are shown in Bulletin MC-100. For more information please write to Thomas Flexible Coupling Company, Warren, Pennsylvania for Bulletin MC-100.



ASK FOR DELCO-REMY MODEL 1117657—THE GENERATOR THAT HANDLES THE TOUGH JOBS—WITH EASE!

This Delco-Remy 12-volt generator—Model 1117657—is the heart of an A.C.-D.C. charging system designed specifically for buses with continuous and extremely heavy electrical loads. It has a low cut-in speed of about 550 rpm, a curb-idle output of 130 amp., and a maximum output of 180 amp. at approximately 2000 rpm. Physically, it is rugged yet extremely low in weight for such a tremendous output. With its matching regulator and rectifier, Model 1117657 will give you all the power a modern bus can use—alternating current for fluorescent lighting, plenty of direct current for other electrical equipment. Specify Delco-Remy A.C.-D.C. charging systems for your buses. They're typical of Delco-Remy leadership in the automotive electrical field.



GENERAL MOTORS LEADS THE WAY—STARTING WITH

Delco-Remy

ELECTRICAL SYSTEMS

DELCO-REMY • DIVISION OF GENERAL MOTORS • ANDERSON, INDIANA

Largest Crankshaft

Recently the largest individual crankshaft ever made was forged at Erie Forge & Steel Corporation, Erie, Pennsylvania from a 72 in. diameter medium carbon steel ingot weighing 210,000 lbs. A similar Erie Forge & Steel 12 Throw Crankshaft is used in a Nordberg diesel engine recently installed at the Ponca City, Oklahoma Municipal Water and Light Department. It is reported that this plant with nine Nordberg diesel engines, has earned net profits of nearly \$5,000,000 in the past 10 years.

The weight of the rough forging was 108,460 lbs., slab size 34½ in. x 23 in., approximately 45 ft long. Within the Erie Forge & Steel plants this forging was machined to 46,000 lbs. finished weight. The finished crankshaft is 43 ft 9 in. long by 15½ in. journal diameter. Bearing surfaces are polished to mirror finish. Every operation from raw material to shipping dock was completed within the Erie Forge & Steel Corporation's plants under the supervision of metallurgists, engineers and craftsmen whose routine production includes steel forgings and castings ranging from less than 20 lbs to 400,000 lbs.

Addition To Sales Staff

Algot A. Green is a newly named sales engineer on the New Orleans branch office staff of Enterprise Engine & Machinery Co. Green will work under the direction of Paul Wabnig, Branch Manager. Serving both marine and stationary diesel engine requirements of the territory, Green will work throughout three states, Louisiana, Alabama, and Mississippi. Announcing the appointment was A. W. Ostrander, general sales manager of Enterprise, who pointed out that Green has been connected with the diesel industry for 22 years, and has most recently served as a field engineer with the Enterprise New Orleans office. Green's background also includes advanced diesel engineering studies at the University of Minnesota. Enterprise offices in New Orleans are located at 441 Baronne St.

And speaking of heat, it's easier to take if the cooling system has had a good flushing and a little rust inhibitor has been added to the water.

Florida Diesel News

By Ed Dennis

A Waukesha turbocharged diesel model 135 DKBS and rated 165 hp is providing power for the Michigan Turbo-Dozer being used in the construction of the Sunshine Turnpike.

LLEWELLYN Machinery Corp. of Miami announces the opening of a Tampa Division at 4630 N. Westshore Blvd. This firm operates sales and service for Euclid's division of GMC, earth moving equipment and the Bucyrus-Erie line of draglines, etc.

THE Mecker Co. at Deerfield Beach is setting up a rock-crushing plant using Cedarapids crushing units. They recently received a TD 24 International dozer and two T55 scrapers powered with Cummins diesels from Florida Georgia Tractor Co. of Miami.

TO PROVIDE power for a small saw mill near Lake Okeechobee, a 6 cyl. Cummins model HIP radiator cooled, with a Twin Disc power take-off, for Mr. F. Hall from Cummins Diesel Engines of Florida, Inc.

FROM Ellis Diesel Sales, Ft. Lauderdale, we heard about the *Sea Dweller*, a 64 footer owned by E. R. Judy of Hollywood and the *Sam-Je* belonging to G. A. Gaunt. Both have General Motors twins of the 6-71 series with GM 2:1 hydraulic rkr gears.

DOWN at Marathon on the Florida Keys, Shelley Tractor & Equipment Co. repowered a dredge for the Marathon Dredging Co. Engine equipment included a D386 Caterpillar diesel rated 425 hp with a Falk flexible coupling to provide power for the 10 in. Georgia Iron Works pump.

PATRICK Air Force Base, near Melbourne and a part of the Guided Missiles Bases, received five 10 cyl Fairbanks-Morse diesel engines model 38F5¼ and rated 825 hp, which were sold to the Corps of Engineers.

J. FRANK KNORR, president of J. Frank Knorr Co., Miami and Tampa distributors of Buda marine diesels, was elected president of the Miami International Boat Show. Peggy F. Leyshon is executive director, L. Fletcher, vice-president.

MIAMI Marine Engineers have been appointed regional dealers for the Mercedes-Benz diesel engines. The new showrooms will be located in the Rhodes Bldg., 339 S.W. North River Dr., Miami.

FOUR DW 21 rubber-tired Caterpillar

tractors with #470 scrapers for Troup Bros. Inc. These are the new turbocharged Cat diesels and make a total of 5 from Shelley Tractor & Equipment Company.

FROM Florida Georgia Tractor Co., Miami, two #6 Northwest draglines powered with Murphy diesel engines, one to S. J. McCarthy, the other to Clem-

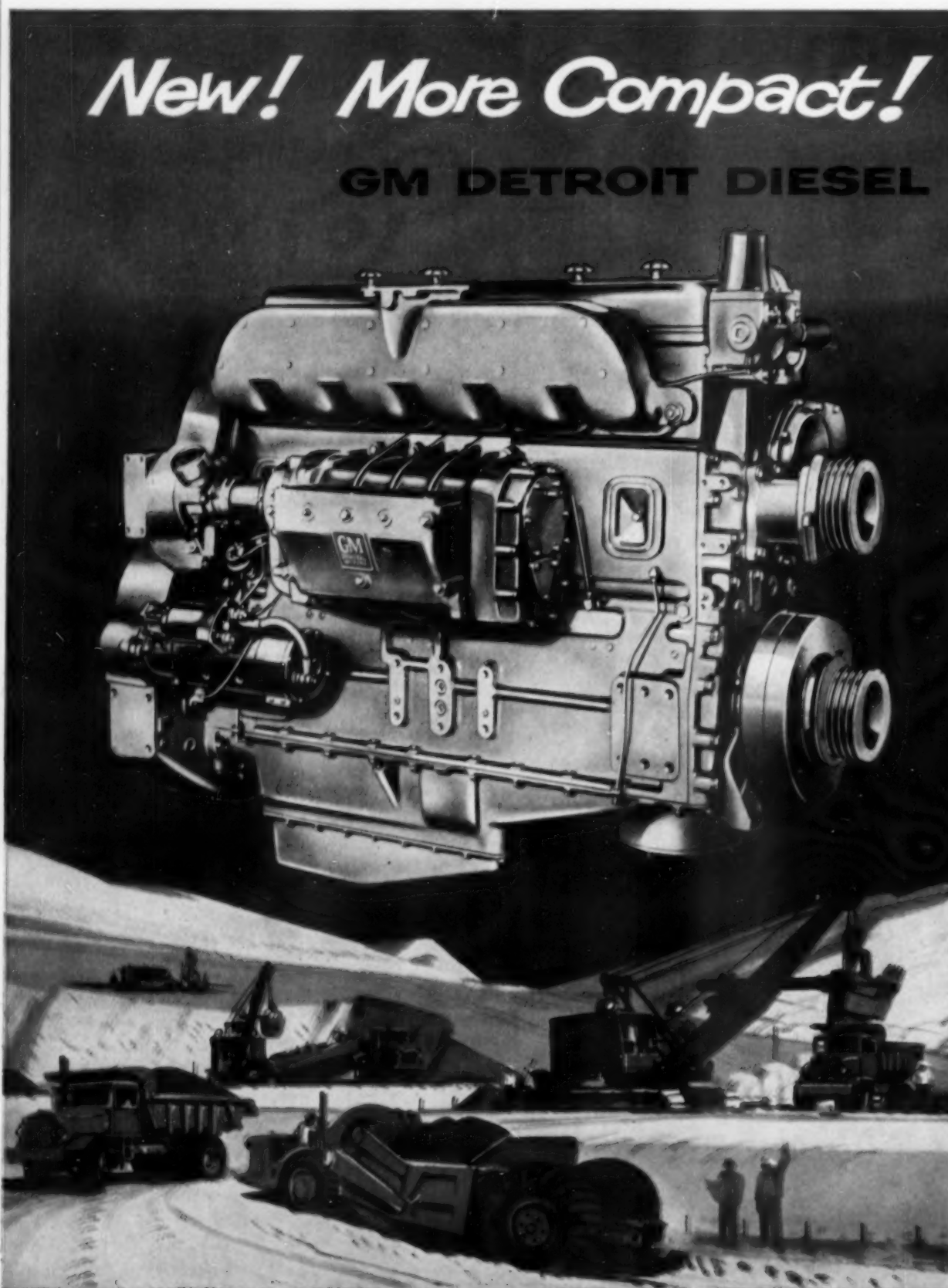
ens Construction Co., West Palm Beach.

AT Broward Marine in Fort Lauderdale, we viewed the palatial yacht *Alisa V* being built for Elmer H. Bobst. The two VT12 Cummins diesels with Snow Nabstedt rkr gears will provide plenty of power for this new yacht.

IT WAS gratifying to see the large num-

ber of dieselized equipment waiting transshipment to the West Indies. Among some of the items on the piers was a dieselized Dart dump truck, a #54B Bucyrus-Erie dragline, several Caterpillar tractors, a Lorain crane, a Cooper-Bessemer diesel engine and an Enterprise diesel engine.

FOR USE on the Sunshine Turnpike, a



T500 Galion road grader and a 10 ton Galion roller. Both have Cummins diesel engines, for the R. H. Wright Construction Co. of Ft. Lauderdale.

GENERAL Motors dieselized equipment recently delivered included a 2-71 in a Unit crane for Gold Coast Fill Co. of Hollywood and the Gar Wood #75-A ¾ yd dragline for Max Cole contained

a GM 3-71 diesel engine.

J. FRANK KNORR, Inc., distributors of Buda marine diesels, will open a branch office for sales and services at the Lauderdale Marina, Ft. Lauderdale.

FOR USE in the Dominican Republic, West Indies, two industrial model DFXH Hercules diesel engines rated 240

hp at 1800 rpm each. These are to provide power for air compressors used on construction work. Sold by Auto Marine Engineers of Miami.

THIRTY model JT-6-B Cummins diesels in model 175 White Freight-liners ordered by Great Southern Trucking Co., rated 175 hp. These cab over engine jobs will operate between Miami and

Jacksonville on regular schedules.

PLATO COX, president of Auto Marine Engineers, Miami, announced that they have been appointed sales and service distributors for the Enterprise diesel engine in South Florida.

DIESEL Engine Sales has entered the trawler brokerage field and will sell new and used trawlers. Clifton E. Bain of Hookers Point, Tampa, will supply service for the Petter Diesel engine to the shrimp fleet. The newly launched Sanders trawler *Miss Marie* has a GM 6-71 in the engine room.

ELLIS Diesel Sales & Service, Ft. Lauderdale, has an open Navy contract to overhaul their 6-71 diesels and install new type engine controls.

Portable Rack for Engine Parts

The Kent-Moore Organization offers a new, portable rack that will accommodate all the parts and components of any Detroit Diesel engine. The rack holds the parts in neat arrangement for easy inspection and assembly. This manufacturer of engine repair equipment and tools states that the J-6387 Diesel Engine Parts Rack was designed specifically to accommodate Detroit Diesel engines—Series 51, 71 and 110—but may be easily adapted to other makes and models.

Over 60 sq ft on four properly placed shelves eliminate stacking and piling of precision parts on crowded benches or floors, thereby improving the appearance and keeping parts clean during every step of the operation. The rack even holds the engine block allowing the entire disassembled engine to be moved or stored without any separation of parts.

Among the features of this new rack are: 1. A bracket to secure the flywheel. 2. An adjustable clip for the camshaft. 3. Rubber or plastic guards to protect vital engine parts. 4. Two rigid and two swivel wheels for easy maneuverability. The crankshaft is held safely and accessibly with a special base and snap-chain device. This new Kent-Moore Parts Rack—shipped in knocked-down condition—is easily and quickly assembled. For price and delivery information, write Kent-Moore Organization, Inc., 1501 South Jackson Street, Jackson, Michigan.

IT'S HERE! JUST OFF THE PRESS! Bigger, better, completely revised, rewritten and brought up to date. It's Volume 21 of DIESEL ENGINE CATALOG, now ready for mailing. Mail orders are now being filled for this giant reference book, with its all-new, profusely illustrated engine and accessory sections. Orders are being accepted for this limited edition, which costs \$10 postpaid plus California sales tax where applicable. Send checks or company form orders to DIESEL PROGRESS, 816 N. La Cienega Blvd., Los Angeles 46, California.

More Versatile!

300-H.P. SERIES 110 ENGINE

Now available to fit a broader range of power equipment

Now the best 300-horsepower Diesel is even better than ever—ready to step up production and cut costs on any job you name.

It's the time-proved General Motors Series 110 Diesel, newly equipped with a side-mounted blower similar to the one used on the famous 71 Series. It's a more compact engine. It's shorter. It's lower. It fits more applications than ever before.

You can have this new GM Detroit Diesel Series 110 engine installed in off-highway trucks and move bigger loads faster.

You can use it to increase the power of heavy crawler tractors, scrapers and air compressors—get more work per day and per dollar.

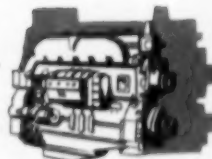
And, in practically no time at all, you can have this new Series 110 Diesel installed in almost any 3-yard shovel—to move earth faster at less cost.

The new blower makes the Series 110 engine far more versatile—available with either right- or left-hand rotation, and a wider range of accessory drive outlets—four accessory drives on the rear of the engine, and four fan-mounting positions on the front.

This new Detroit Diesel Series 110 engine takes on all comers in operating efficiency. It's a leader in work output per dollar. Let your local GM Detroit Diesel Distributor or Dealer show you what we mean.

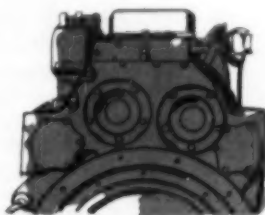
New Compactness—

The side-mounted blower eliminates former style blower at the end of the Series 110 engine and also cuts down height. Easier to install—easier to maintain.



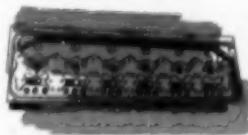
New Flexibility—

Four accessory drive outlets on rear of engine. You can direct drive both a hydraulic pump and an air compressor off the engine at the same time. New gear train features wider gears with increased helix angle for longer life. Blower and camshaft loads are split.



New long-life Cylinder Head

Has many design improvements, including integral water manifold and drilled passages for rocker-arm lubrication. Water manifold studs and gaskets eliminated. Outside rail gives extra rigidity.



New Governor

Is more easily serviced—utilizes many Series 71 parts. Provides for tachometer drive. An accessory drive may also be taken off the governor drive gear.



DETROIT DIESEL

Engine Division of General Motors, Detroit 28, Michigan

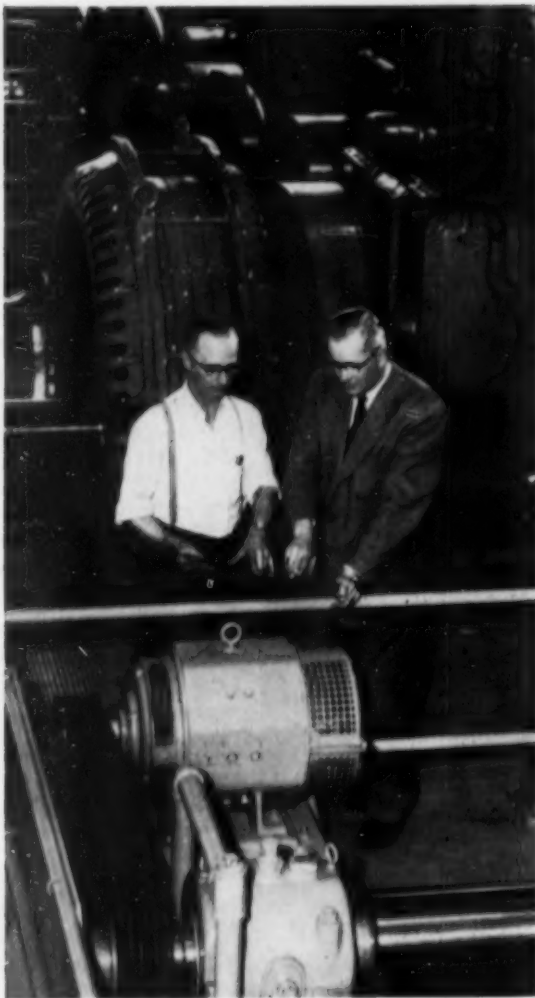
Single Engines . . . 30 to 300 H.P. Multiple Units . . . Up to 893 H.P.
In Canada: GENERAL MOTORS DIESEL LIMITED, London, Ontario

AMERICA'S LARGEST BUILDER OF DIESEL ENGINES

This utility gets better engine performance ... less cylinder and ring wear with

STANODIESEL Oil M

*Report on Cumberland,
Wisconsin, Municipal Utility's
experience with diesel lubricants.*



Clarence Maxcy (left), Chief Engineer at Cumberland, and Standard Oil lubrication specialist Ralph Rowlands check efficiency records of utility's engines lubricated with STANODIESEL Oil M. Providing technical service on lubrication problems is something for which Ralph Rowlands is well qualified. He has been doing this sort of work with Standard for 13 years. Ralph attended the University of Wisconsin and is a graduate of the Standard Oil Sales Engineering School.

Management of Cumberland, Wisconsin, Municipal Utility found a way to extend time between ring changes, to get greater fuel efficiency and to cut cylinder wear. How? By using STANODIESEL Oil M.

Before converting to STANODIESEL Oil M, the utility found it necessary to change rings every 1,500 to 2,500 hours. Cylinder wear ranged up to .003" per 1,000 hours of operation. After the engine was converted to STANODIESEL Oil M, it was run 7,800 hours at 50 to 90 per cent of full load. No rings had to be replaced during that time. The engine was then overhauled. All rings were free. All pistons were clean and in excellent condition. Ring wear was apparent on the two top rings only, bottom rings were like new. Cylinder wear after 7,800 hours averaged .003". This amount of wear occurred after 1,000 hours with the oil formerly used. On some cylinders, wear was only .001". Maximum bearing wear was .0005". Fuel efficiency over the period averaged 12.93 K.W.H. per gallon.

This kind of performance—reduced wear, increased fuel efficiency, improved overall engine performance—is what you can expect from STANODIESEL Oil M. Find out more. Call your nearby Standard Oil lubrication specialist. There is one near you in any of the 15 Midwest and Rocky Mountain states. Or write, Standard Oil Company, 910 South Michigan Avenue, Chicago 80, Illinois.

STANDARD OIL COMPANY
(Indiana)



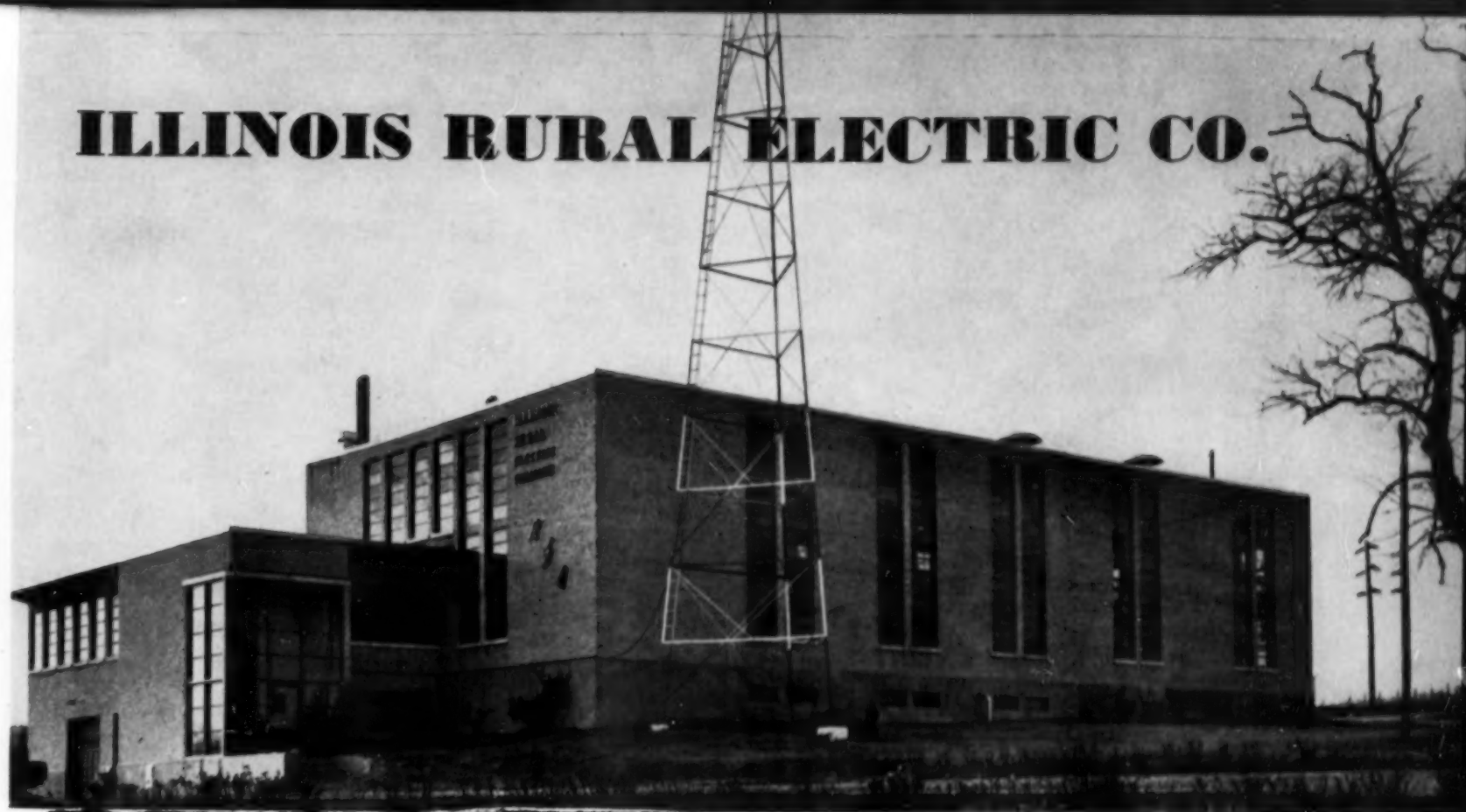
Piston from engine using STANODIESEL Oil M photographed just as it was pulled for 7,800 hour overhaul. Piston is clean and in excellent condition.



Quick Facts About STANODIESEL Oil M

- Is refined from highest quality base stock. Has superior stability.
- Contains special additives that:
 - Inhibit oxidation, control unwanted increases in oil viscosity.
 - Keep crankcase, pistons, cylinder walls and other parts clean.
 - Keep contaminants in suspension, prevent them from depositing.
 - Control foam, make oil suitable for use in hydraulic governors.
 - Increase the oil's ability to reach and maintain a film on highly stressed parts.

ILLINOIS RURAL ELECTRIC CO.



MODERN farmers in West Central Illinois are demonstrating without fuss or fanfare how to make maximum use of electrical energy, both on the farm and in the home and how to produce that electricity economically. It is not just that farm wives in Greene, Scott, Pike and Calhoun counties match their city cousins in the use of washing machines, dryers or electric ranges. Nor is it just that the farmers in these counties—and in Cass, Jersey and Morgan counties—match Chicagoans in their use of radio, TV or air conditioning. Actually, some are buying the year-round comfort of electrical heating and cooling—still dream stuff in the big cities like Chicago.

Aside from this extensive use of modern appliances in the home, these progressive farmers also have put electricity to work on the farm. For example, they have found that electrically dried corn is worth 6 to 7 cents more a bushel and costs just a cent to dry. It sounds startling to the uninitiated but it pays to air condition the pig house. It takes about 600 lbs. of feed to put 100 lbs of meat on a hog that swelters through the summer months, but only 300 lbs. of feed to achieve the same weight gain on a hog kept in an air conditioned house.

This combination of modern living and watt farming takes a lot of electricity and in the seven counties mentioned above, the demand for moderately-priced power is met by the two generating stations of the Illinois Rural Electric Company. Under the direction of Manager S. R. Faris, this progressive REA cooperative has promoted greater use of electricity by the farmer and then has met the demand with efficient power production. Within the past year, the cooperative has more than doubled the size of its Pittsfield station with the installation of two 3870 horsepower Nordberg Duafuel engines. Illinois Rural Electric was organized in 1937 and

the following year put a new diesel plant into service at Winchester with three 625 hp Busch-Sulzer engines. By the end of 1939, the plant was serving 1182 members over 686 miles of energized line and generation for the year reached a total of 1,128,210 kwhs. Just five years later, the number of miles of line had doubled, the number of members served had tripled and the kilowatt-hour production was quadrupled. The cooperative then called on the Stanley Engineering Company to survey their requirements and make a long-range plan.

The first phase of the development was the installation of a 1500 hp Busch-Sulzer diesel at Winchester in 1946 and another identical unit the following year. Then, in December, 1950, the Co-op put into service at Pittsfield, Illinois, a completely new diesel plant with three 1645 hp engines. The building was designed to permit further expansion and this long-range planning paid off handsomely. For the year 1950, generation totaled 15,020,944 kwhs to serve 6791 members over 2406 miles of line. Within four years time, the load again climbed perilously close to system capacity and Illinois Rural Electric undertook its largest expansion of power generating facilities.

In 1955, the Pittsfield plant put into service two Nordberg Duafuel engines. Each of these two-cycle units has 9 cylinders of 21½-in. bore and 31-in. stroke, and is rated 3870 hp at 225 rpm. Each engine drives a 3000 gross kw generator with a 40 kw belt-driven exciter. The new Nordberg engines went to work just in time, for Mr. Faris reports that the system could not carry its present peaks without them. Production for the year 1955 topped 28,500,000 kwhs, supplied over 2899 miles of line to 8527 members. Increase in the number of consumers naturally has been an important factor in raising the kwh total, but increase in the average

use per member has had even greater impact. Originally, system planning was on the basis of an average monthly consumption of 50 kwhs per member. In 1955, the average reached 230 kwhs. Mr. Faris and his staff now calculate on a basis of 400 kwhs and actually expect to achieve this average in 1957. Some of the larger farms already use 1500 to 2000 kwhs a month.

The two big Nordberg engines not only provide an efficient means of carrying the load this year but they also have a reserve capacity of handling the anticipated peaks in 1958. In the meantime, the Co-op has found a profitable means of utilizing this reserve. An agreement has been reached with the nearby City of Jacksonville to supply the city with a 2500 kw block of power through 1957 while the municipal plant expands its own generating facilities. After that, the REA Co-op and the City will maintain the interconnection and make such arrangements for power sales as prove profitable for both parties concerned.

It was logical that the new engines should be assigned as base load units with one in service 24 hours a day and the other normally running from 4 p.m. to 10 p.m. to help with the peaks. First, as the largest units in the system, the Nordberg engines were best suited for base load service. Second, they operate economically on natural gas with a small quantity of pilot oil. Third, they can be switched over instantaneously from dual fuel to straight oil operation when interruptions of the gas supply occur and can go back to gas immediately.

It is too early for extensive documentation of the engine's fuel efficiency but already there is evidence that the new units will improve plant performance. Fuel and lubricating oil cost tests were conducted at the Pittsfield plant under normal load conditions



The two big Nordberg engines are shown in the clean and modern Pittsfield plant. The position of the Young intercoolers is clearly shown in this view and one of the large Nordberg gauge boards serving each engine can be seen in the background.

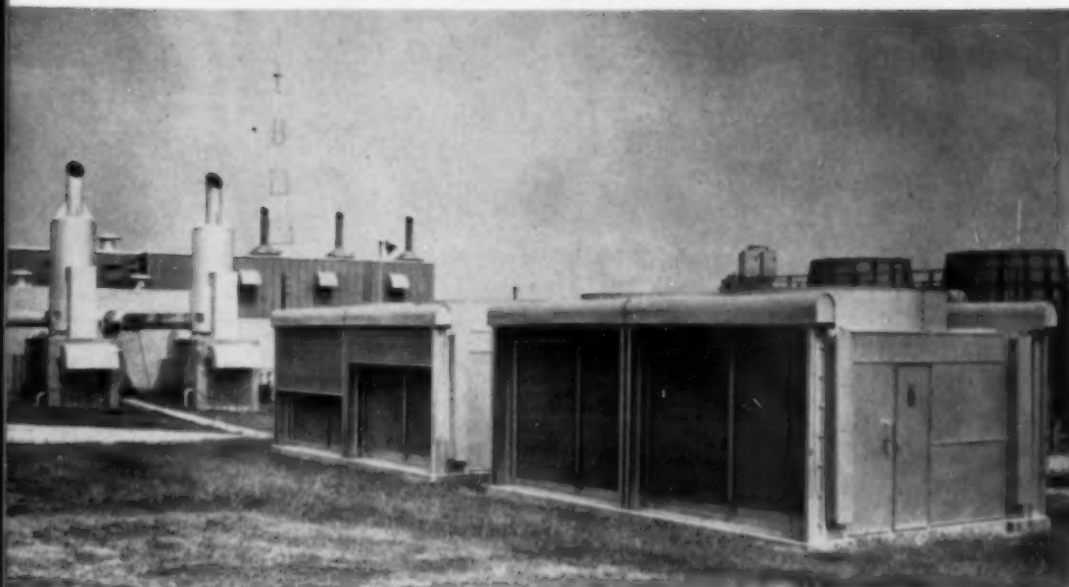
and they demonstrated the potential of the two Nordberg units. For example, the No. 4 engine, operating at full load, produced a kilowatt-hour on a fuel consumption of 9.55 cu. ft. of natural gas and 0.004 gal. of pilot oil. Calculating on the basis of higher heating value, this represented 9407 Btu of gas and 550 Btu of oil for a total of just 9957 Btu per kwh. Pilot oil was 5.5 per cent of the heat total. With gas at 29 cents per mcf and pilot oil at 11 cents a gallon, the fuel cost per kwh was just 3.2 mills. Initial production figures show the engines equal to or better than the test figures for comparable load conditions. Gas is obtained on an interruptible basis. In November, 1955, for example, the Pittsfield plant was off gas for 27 hours

and 5 minutes. At that time, the Nordberg Dualfuel engines proved the advantages of instantaneous switch-over to straight oil.

The Pittsfield plant is within reach of a major gas pipeline and the Co-op itself provided the tie-line to the plant. Gas reaches the meter house at close to 100 lb. pressure and is reduced by pressure reducing valves to 27-29 lbs. for admission to the engines. A continuous temperature record is kept and gas is measured in orifice meters. At the engine, governor-controlled hydraulic actuator pumps open the valves that admit gas to the cylinders. For dual fuel operation, the plant uses a 37.2 gravity pilot oil at a delivered price of 11 cents a gallon. When

gas is cut off and the engines switch to straight diesel operation, the operators switch to a special 28.5 gravity fuel oil which is a cent cheaper. There are four 50,000 gal. vertical storage tanks, three of which are used for pilot oil. Oil is transferred to individual 250 gal. day tanks by float-controlled, motor-driven pumps. Pilot oil for the Nordberg engines is handled by the same injection pumps and nozzles that serve for full diesel operation, simplifying design and eliminating possibility of clogging the idle set of pumps and nozzles.

Volume and temperature of scavenging air are controlled to provide the best air-fuel mixture for all load conditions. Air for each of the Dualfuel en-



Two Young radiators, hooked in parallel, are equipped with two high-and-low speed fans each for cooling jacket water for the Nordberg engines. The fans are under push-button control from the engines' gauge panels, and the rolling doors on the radiator housings can be adjusted to use wind velocity in the cooling process. The concrete filter house contains filter traveling curtain intake air filters. The Marley aquatowers, behind the filter houses, serve the intercoolers which reduce intake air temperatures in the summer months.

gines is drawn through a self-cleaning air filter of the traveling curtain type which is located in a concrete filter house outside the plant. A 19,450 cfm centrifugal blower, driven at 3550 rpm by a 350 hp motor, feeds the air through an intercooler to the engine intake header. Each intercooler is served by a small forced-draft cooling tower. In cold weather, some or all of the air can be drawn through a jacket around the exhaust snubber mounted on the roof of the filter house. In hot weather, the air is reduced as much as 25 degrees by the intercooler. Volume of air is controlled by exhaust temperature through an automatic controller which actuates an air motor which in turn positions vanes in the blower to obtain the desired air output for the engine.

Limited water resources influenced the choice of radiators to cool the two 3870 hp engines and the result has been a highly flexible cooling system. Two large radiators are arranged in parallel so that either or both can be used. In each radiator are two motor-driven fans which can be operated individually, either at high or low speed. In addition, vertical rolling doors can be raised or lowered to utilize or limit atmospheric cooling. Motor-driven centrifugal pumps circulate water through the engine jackets and through the finned tubes of the radiators with an automatic thermostatic valve to bypass water around the radiators as necessary to maintain desired jacket temperatures. All four radiator fans can be controlled from either of the panels located alongside each of the Nordberg engines in the plant.

Flexibility has also been built into the lubricating system. The lubricating oil is kept in an ample size storage tank and makeup oil is pumped to the engine sump tanks as needed. Lube oil is circulated through the engine, strainer and lube oil cooler by an engine-driven pump. Some oil is bypassed

from this pressure system through a filter. When the engine is shut down, the filter continues to work with a motor-driven pump bringing oil from the sump. If desired, lube oil can be pumped from the sump to a dirty-oil tank, put through a purifier and stored in a clean-oil tank or returned to the sump. Each of the Nordberg engines has a motor-driven auxiliary lube oil pump which functions regularly as a before-and-after pump and also serves as a standby for the engine-driven lube oil pump.

The success of Illinois Rural Electric can be traced to enterprising market development and sound operation of efficient, heavy-duty equipment. For example, it is no accident that Rural Illinois should be a pioneer in heating homes by electricity. The growing use of air conditioners caused the Co-op management to seek a cold weather load to balance summer refrigeration. A \$12,000 study resulted in 19 resistance-heated homes and 3 more utilizing electric-driven heat pumps for both heating and cooling. With rates at 1.5 cents a kwh, electric heating is competitive with oil. Mr. Faris thinks it may be possible to cut the rate to 1.25 cents

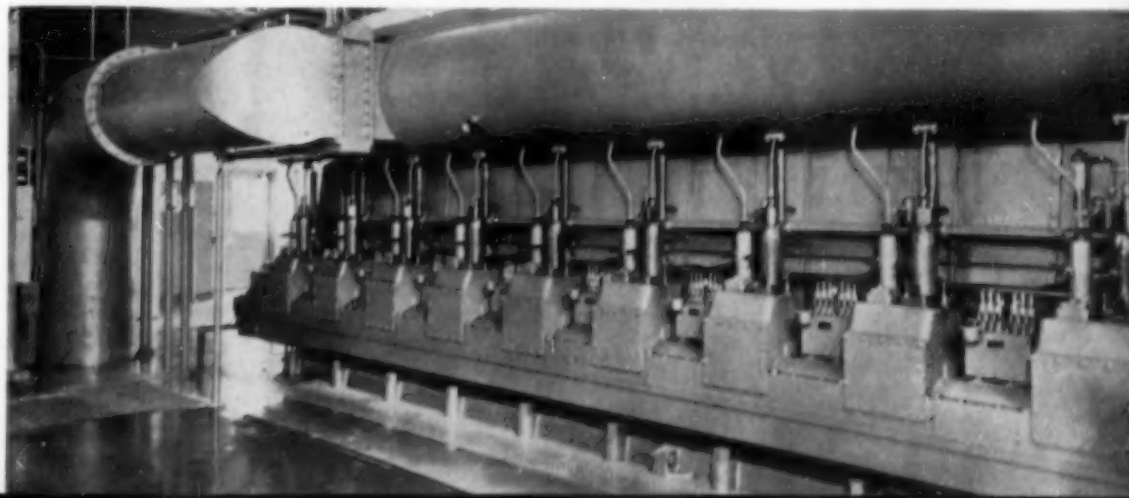
which will make electric heating cheaper than either oil or gas heating.

The Cooperative's progressive policies must be credited in large measure to the local farmers and businessmen who serve as officers and directors: F. J. Longmeyer, president; Walter Strubinger, vice president; Howard Hurrelbrink, treasurer; Leonard Wood, secretary; Roy Wieneke, R. J. Myers, Henry Day, V. T. Parks, Louis Osterman, H. L. Vortman, and Robie Wallace. The operating staff, headed by Manager S. R. Faris, includes: Lennis Williams, acting superintendent of generation; David Welsh, chief engineer; Deon Pinkerton, superintendent of transmission and distribution; Harold Eaves, chief operator at Pittsfield; and Jack Maberry, acting chief operator at Winchester.

List of Equipment

Engines—Two 21½ in. x 31 in. Dualfuel engines, rated 3870 hp each at 225 rpm. Nordberg.
Generators—Two 3750 kva, 3000 gross kw, 4160/2400 v., 3-phase, 60 cycle generators v-belted to two 40 kw, 125 v., 1150 rpm exciters. Elliott.
Governors—Woodward.
Fuel oil injection pumps—Bosch.
Fuel oil transfer pumps—Roper.
Fuel oil meters—Bowser.
Fuel oil filters—Nugent and Hilliard.
Recording thermometer—Bristol.
Lube oil filters, cartridge-type—Hilliard.
Lube oil purifier—Hilliard.
Lube oil cooler—Ross.
Cylinder lubricators—Manzel.
Jacket water pumps—Allis-Chalmers.
Auxiliary lube pump—DeLaval.
Intercoolers—Young Radiator.
Intercooler cooling towers—Marley.
Air intake filters—American Air Filter.
Centrifugal blowers—Roots-Connersville.
Blower motors—Elliott.
Scavenging air controllers—Bristol.
Air compressors—Gardner-Denver.
Pyrometer—Alnor.
Level meters—Liquidometer.
Safety control panel—Viking Instrument.
Fuel oil—Standard Oil Co. (Indiana).
Gas—Panhandle Eastern Pipeline.

The Nordberg Dualfuel engines are two-cycle units, rated 3870 hp at 225 rpm. The Young intercooler, American-Bosch injection pumps and actuators and Manzel cylinder lubricators are shown.





This Model 75 Payscraper is driven by a 262 hp Cummins diesel and it heaps 20 cu. yds. It will travel 24 mph over the ground, and power steering is standard equipment.



I-H POWER SHOW

By ARNOLD B. NEWELL

CHICAGO, May 15th—Today at the International Harvester Company's proving grounds, I was privileged to witness a most impressive display of mechanized construction equipment staged for a selected group of magazine editors and writers. They came from all corners of the country at the invitation of the makers of this equipment for a two-day press party which included a tour of the Tractor Works at 31st St. and Western Ave. in Chicago and the huge plant at Melrose Park. Then the Harvester executives entertained us at the Tam O'Shanter Country Club in a manner to be remembered for the fine food and the good company we were in, but we shall not dwell at length upon the festive part of the show nor the tours of inspection which had given us an opportunity to see how the equipment is built and become acquainted with men responsible for what we saw.

We were, of course, looking for something new and there was no disappointment. To my way of thinking the most interesting item of entirely new design was the Model 12 Payloader which incorporates the experience of the Frank G. Hough Company, a wholly owned subsidiary, in the manufacture of some 25,000 rubber-tired tractor shovels combined with the know-how of the parent company in crawler type tractors. The Model 12 has speed and power, maneuverability and maintenance accessibility in a neat package of earth-moving efficiency while providing the utmost comfort for the operator for operational speed. Powered by the UD-35 diesel rated 91½ hp at 2200 rpm, this tractor has a 1¼ yd bucket capacity and three speeds in each direction of operation for 0 to 10.1 mph ahead and 0 to 13.1 mph in reverse.

General arrangement with rear mounted engine

gives optimum weight distribution throughout the full length of the track without a counterweight. Accordingly life is prolonged for track chains, idlers, rollers and other track parts. Controls, steering clutches and steering brakes are power boosted for fast manipulation and to decrease operator fatigue. The torque converter with a multiplication factor of 2.1 to 1 is immediately behind the engine in an accessory drive case which acts as a mounting base for the main hydraulic pump, torque converter, transmission oil pressure regulating valve and the transmission oil filter.

The transmission is a three-speed, full reversing, power shifted, constant mesh gear box making the Model 12 Payloader the fastest crawler-tractor-loader in the field today. Shifting can be made up or down—forward or reverse, at any time at any throttle setting. The demonstrated performance was breath-taking. For example, at full rpm of the engine and full speed over the ground, the control went through the entire range with the smoothest imaginable response. The Model 12 Payloader is mounted on the TD-9 tractor with extended track frames equipped with 15 in. wide low profile grouser shoes. The hydraulic system is backed by experience gained in the manufacture of some 25,000 rubber-tired loaders. This system is well known in the field of operation.

The other new items are the 18 and 24 ton off-highway rear-dump trucks. The two models of these aptly named Payhaulers are the result of testing in the field at 44 different contracting, mine, quarry, and other applications. Ten experimental trucks were built, 5 of each size, incorporating many desirable features gleaned from field surveys. These trucks were loaned to users for testing pur-

poses. Test data compiled after a year's operation were incorporated and final designs took form. The Model 65 and Model 95 Payhaulers are now coming off the assembly line.

The overall dimensions of the 95 Payhauler equipped with a standard body are: wheel-base is 13 ft 9 in., overall length is 26 ft 1 in., overall width is 11 ft 6 in., loading height is 9 ft 2 in., turning radius 30 ft 5 in., empty weight with quarry body equipped with torque converter, 47,980 lbs., with 9 speed transmission, 46,610 lbs., with a standard body and torque converter transmission 48,220 lbs., with 9 speed transmission, 46,850 lbs.

The Model 65 Payhauler has a wheelbase of 13 ft 2 in., overall length 24 ft 11 in., height 11 ft, width 10 ft 8¾ in., loading height 9 ft. Clearance under the front axle 15 in., clearance under drive axle 14¾ in., turning radius 29 ft 3 in., empty weight with quarry body equipped with a five speed transmission 39,865 lbs., 10 speed transmission 40,160 lbs.

A Cummins turbocharged diesel developing 335 hp at 2100 rpm, powers the Model 95. The 18-ton, Model 65, is powered by a Cummins turbocharged diesel of 250 hp at 2100 rpm. The Model 65, with either the 5 or 10 speed transmission, and air assisted master clutch, can roll along at 36½ mph, and the Model 95 has a top speed of 37.2 mph when equipped with a standard 9 speed transmission and a top speed of 38 mph with a torque converter and power shift transmission.

International's new 1956 line of self-propelled, rubber-tired Payscrapers, in the field since March, 1956 are among the easiest and best-loading scrapers ever produced. Design changes in the 262 hp,



connecting rods, a counter-balanced crankshaft with induction-hardened journals to make it one of the most rugged tractors in its class today. The power train has been strengthened to match the tractor's greater performance. Cerametallic engine clutch facings are standard equipment on the TD-6 model and all other models. Like all other crawler tractors in the International line, the TD-6 features all-weather electric solenoid push-button starting.

A 32 per cent increase in drawbar hp brings the drawbar rating on the new model TD-9 crawler tractor up to 54.5 hp—engine hp to 66. Transmission and final drive are strengthened to match the new International four-cylinder diesel engine's greater power output.

A boost in engine power of 12½ per cent gives the TD-14 crawler tractor 78.5 hp. Transmission and final drive have been strengthened to handle the extra power. Smoother power is provided by a new gear-driven engine balancer.

The major feature in International's new 1956

TD-18 crawler tractor is increased power. Its 6-cylinder diesel engine now gives 103 drawbar hp. Final drives are designed for heavy, rough and tumble work and positive sealing keeps out abrasives while retaining lubricant. Long-lasting, cool-running steering clutches are engaged with pressure spring, providing positive, uniform clutching pressure. The TD-18 muffler has been placed under the hood and the air cleaner has been side-mounted on the engine. Full-flow oil filtration, exclusive International fuel injection system and positive air filtration are added features. Heavy-duty hinged radiator guard encloses a new isolated mounted one piece radiator assembly.

One of the huge TD-24 torque converter tractors equipped with a bulldozer blade was also displayed. Completing the list of equipment shown were six Hough Payloaders and four International power units all mounted on two trailers pulled by an International 300 utility tractor. Two sizes of the new V-line of motor trucks were shown—Model VF-202 with dump body and the Model V-195 tractor and trailer unit.

Everything's within easy reach in new roomy operator's compartment of 103 drawbar hp International TD-18 crawler tractor. Other comforts for operator include new hydraulic power steering and positive, self-energizing brakes. TD-18 develops 24,300 lbs. drawbar pull.

Speed is emphasized in the new International Model 12 Payloader which has a top speed of 10 mph forward and 13 mph in reverse. Payloader raises loaded 1¼ yd. bucket from ground level to maximum 8 ft 10 in. dumping height in about 11 seconds, lowers it to ground level in less than 9 seconds.

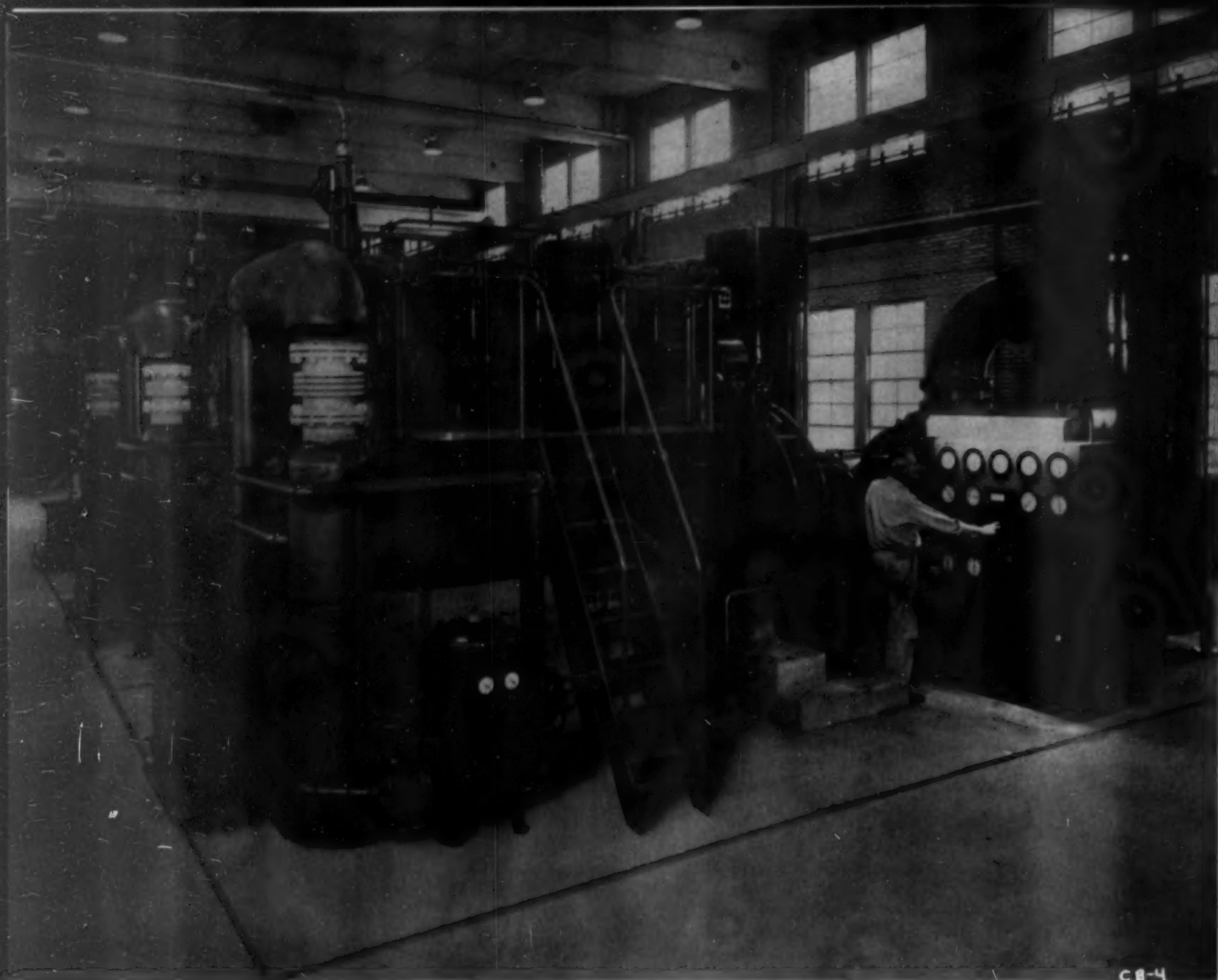
Model 75 Payscraper and the 172 hp Model 55 have resulted in stepped up capacity and efficiency. The back of the new bowl has been shaped like a dozer blade enabling dirt to flow up and back and heap exceptionally well to top and sides. A new, lowered draft frame and larger push-block directs push and pull power effectively to reduce loading time.

Capacities have been increased to take advantage of the high ratio of hp to capacity and new ease of loading. The Model 75 now heaps 20 and the Model 55 heaps 14 cu. yds. Both can be equipped with sideboards to further increase the capacities. Another important change on the 75 is introduction of the cerametallic clutch, made of ceramic material and fused, powdered metal. This is the same combination of metals and ceramic materials used in International crawler tractors and off-highway trucks. The clutch runs longer with fewer adjustments in this design.

Designed for ground-hugging traction, the low-silhouette Payscraper has a top speed of 24 mph, ample ground clearance, and a low center of gravity for maximum stability over uneven terrain. The engine in the model 55 is a Cummins HRB-600 rated 172 hp at 1800 rpm. The big Model 75 is also Cummins diesel driven with a 262 hp turbo-charged engine taking its rating at 2100 rpm. The new PT fuel injection system is used on both of these Cummins engines.

Several improvements have been made in the crawler tractors. The new 1956 TD-6 has increased drawbar hp from 33.7 to 41.5, making it even more versatile. Its new 4-cylinder diesel is fitted with hardened, replaceable cylinder sleeves, drop-forged





Engine room at Cleveland Southerly. In foreground are 3 Cooper-Bessemer dual-fuel engines, Type JS, 420 hp driving Roots-Connorsville positive displacement blowers of 10,000 cfm each.

CLEVELAND SEWAGE PLANT

Dual Fuel Engines Do A Two-Way Job At Cleveland Southerly Sewage Treatment Plant

By G. E. FLOWER*

CLEVELAND Southerly's newly completed sewage treatment plant heralds many new developments in the treatment and handling of sewage. Of these, the efficient utilization of waste heat from the engines that drive air blowers for aeration of sewage offers advantages of special significance to sanitation engineers of both large and small municipalities.

The needs for power, air and heat for the treatment

*Commissioner, Division of Sewage Disposal, City of Cleveland, Ohio.

of sewage at Cleveland, Ohio, are economically handled by the efficient use of engine-driven blowers. The power is generated by dual-fuel engines fueled with by-product sewage gas from digestion tanks. Air for aeration of sludge is supplied by blowers, driven in turn by dual-fuel engines. Waste heat for accelerating the speed of digestion is recovered from the same water system that cools the engines. The net effect is a power-heat air system that virtually runs itself. It is a system that requires only a nominal amount of diesel fuel to maintain any desired level of operation through both the summer and winter months.

In the most recent expansion program, four new engine-driven blowers have been added to meet projected requirements of the Southerly plant. The capacity of these four units, plus two original engine-driven blower units, will fulfill expected needs of processing 68 million gallons of raw sewage daily. The capacity anticipates sewage requirements of Greater Cleveland to the year 1970, with two of the six compressors as standby units.

The engines selected to drive the blowers are Cooper-Bessemer 5-cylinder, JS units, rated 462 hp each. Three of the engines are operating as dual-

fuel units. Each of these three engines can be run entirely on digestion gas, using conventional No. 2 diesel fuel for ignition purposes only. The fourth engine is a straight spark-ignited engine for operation on digestion gas. Dual-fuel engines have been incorporated for this service because of their versatility of operation. They can run as full diesels entirely on fuel oil, or on digestion gas, using only a small quantity of fuel oil for ignition purposes. These engines can also operate on any ratio of gas to oil within the engine, automatically regulating its own gas-to-oil ratio, dependent on the engine speed and the availability of digestion gas. With the dual-fuel operation, it is possible, therefore, to compensate for temporary shortages in digestion gas fuel which normally would shut down conventional spark-ignited gas engines and in turn slow down the aeration and digestion processes.

The two original engine-driven blower units installed in 1937 were Cooper-Bessemer, 420 hp GN units. They are spark-ignited units that run entirely on digestion gas. With the combination of Cleveland Southerly's three spark-ignited units and three dual-fuel engines, it is possible to regulate the operation of the station to suit any need in the treatment of sewage. Digestion gas for fueling the engines is furnished from a 57 ft. 6 in. storage tank at 30 psi. The pressure is then reduced to 24 psi at the engine. The heat value of the gas is 600 to 650 btu per cu. ft.

New modernized \$16,500,000 sewage treatment plant for City of Cleveland, Ohio, Cleveland Southerly Plant. Addition to engine house and aeration tanks is shown.

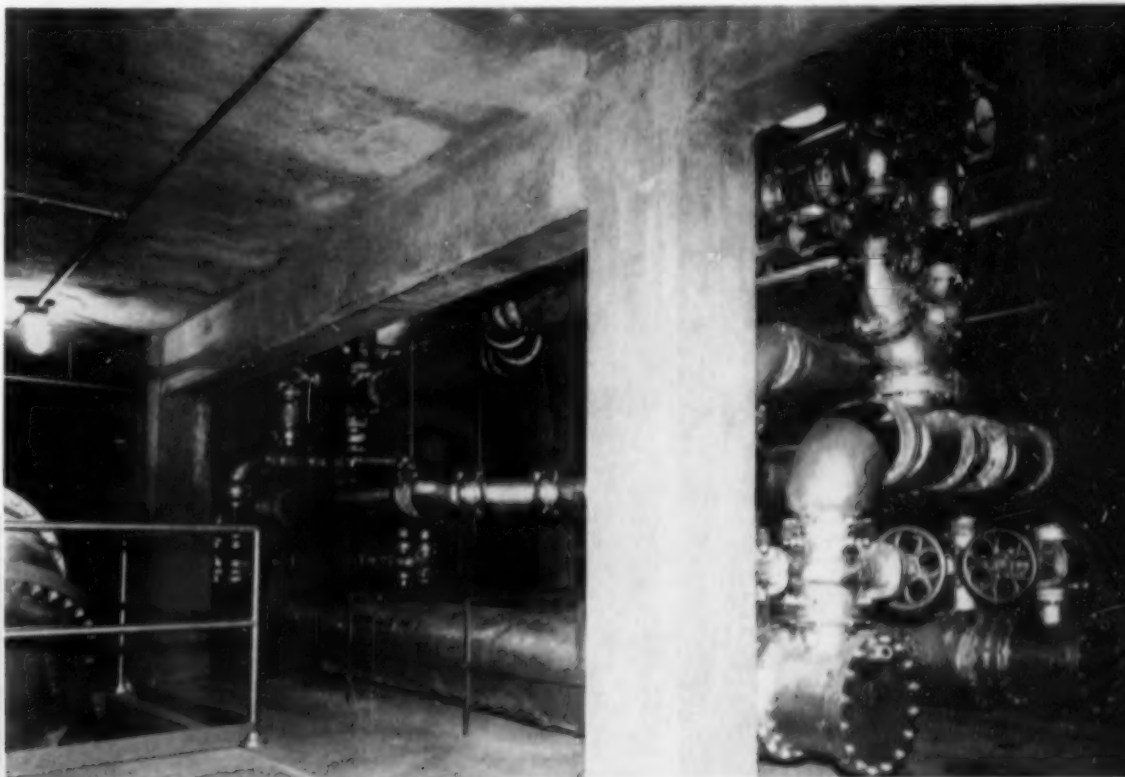
The compressors are Roots-Connorsville positive displacement blowers directly driven from the Cooper-Bessemer engines. Each blower has a capacity of 11,000 cu. ft. per minute, which added to the capacity of the two original blowers of 10,000 cu. ft. per minute each, boosts the station capacity to 64,000 cu. ft. per minute. Air furnished by the blowers at 6 to 10 psi is used for the treatment of sludge which includes aeration, operation of return sludge, air lift and channel aeration.

Heat for the treatment of sludge is provided by heat exchangers located directly in the plant's di-

gestor control galley. The heat is used to increase the temperature of the raw sludge to accelerate the digestion process before the sludge is discharged into the digestion tanks. Heat for digestion is recovered from the engines through two water circulating systems having common heat exchangers. These exchangers transfer the heat from the engine cooling system to the sludge heating system. To obtain maximum utilization of this waste engine heat, the water in the sludge heating system is first circulated through the engine's lube oil coolers and then it is circulated through the two main heat exchangers.

Heat exchanger transfers waste heat from engines to waste heat system used for the acceleration of the digestion process.

31



NEW TRACY TUG

By Arnold B. Newell



**This Powerful New
Member of the Tracy
Tugboat Fleet in
New York Harbor,
Kathleen C. Tracy,
Is Driven by a
16 Cylinder General Motors
Cleveland Diesel
Developing 1600
Horsepower.**

THE Tracy Towing Line helps to keep the wheels of progress moving in New York City by towing coal to the numerous powerhouses located along the waterfront. Having just added the fine big tug *Kathleen C. Tracy* to their diesel fleet they now have five, four of which are big ones. Of passing interest is the fact that the coal which is hauled to the waterfront by diesel locomotives completes the journey to the powerhouses in tow of boats driven by diesels for maximum operating efficiency and economy. It should be noted that the Tracy Line also does some general towing and ship docking on New York Harbor to which area their activities are confined.

The *Kathleen C. Tracy* was placed on display by the owners at Pier 1, North River, New York on May 3, and a large number of spectators had an opportunity to admire her, while members of the press and many operators made personal inspections from pilothouse to engine room. In excellence of welded steel construction and fine finish "aloft and alow" she is a credit to her well known builders, the Livingston Shipbuilding Company of Orange, Texas. Measuring 100 ft 5 in. in length, 27 ft beam and 14 ft depth, the *Kathleen* is driven by a General Motors, Cleveland Division diesel, 278-A 16-cylinder V-type rated 1600 hp at 750 rpm. The conventional diesel-electric propulsion system is employed with an Allis-Chalmers 1090 kw, 525 volt dc generator direct connected to the engine, for operation of the 525 volt Westinghouse propulsion motor rated 1380 hp at 600/750 rpm. The 130 volt, 30 amp combined service generator and exciter is mounted on top of the main dynamo and v-belt driven. The propulsion motor drives through a Farrel-Birmingham herringbone reduction gear with a ratio of 4.132:1 speed reduction, which expressed in terms of rotative speed is 750 rpm to 181.5 rpm.

A 56-cell set of Exide storage batteries are floated on the electric service line. This system is interconnected through the switchboard with the two General Motors diesel-generators made up of Model 4-71 Detroit diesel engines, directly connected to dc 120-125 volt, 250 amp Delco generators. The starting systems for these engines include Delco starting batteries. The entire electric control system including the main switch gear in the engine room and the controls in the pilot house as well as on the aft end of the deckhouse were made by Lakeshore Electric of Bedford, Ohio, while the rest of the electric control system, including ship service switchboard was made by the McIntosh Electric Company of Beaumont, Texas. This includes also the running light panels, and the general alarms for the ship, etc.

A closed cooling system is employed for fresh water cooling the main engine which has attached pumps for water circulation through the Ross heat exchangers. Goulds motor driven fire and bilge pumps double as stand-by units for cooling service. The various oil pumps are of rotary type made by Viking. There is one each for fuel transfer, reserve fuel transfer and for lube oil pumping in connection with the Briggs filter which is CD-1P16-175-BX. Starting air for the main engine is supplied by a pair of 2-cylinder air-cooled Ingersoll-Rand, motor driven compressors. Generally speaking Century Electric supplied the motors to drive auxiliary equipment on the tug.

In the after end of the engine room there is a steering gear flat and on each side large portable water tanks are carried. The steering gear is an Almon Johnson Steeromotor driven by a 15 hp Reliance electric motor controlled from the pilothouse and also from the after end of the deckhouse by a Benson Electric steering stand. Heat is supplied by a Kewanee oil fired boiler supplied by Kewanee-Ross. Another contribution to crew comfort is the acoustic board finish in the upper engine room which doubles as a foyer to connect the living quarters. Air jacketed flexible tubing exhaust lines connect the engines to silencers in the stack of the tug.

On the main deck we find comfortable quarters for the mates and engineers. Some crew members have bunks down forward. The galley is aft. It is electric with an Akron range and a Warner refrigerator in which is incorporated a deep freeze element. A matter of interest is the fact that a generator must be in operation to use the galley range as the power demand would exceed the storage battery supply.

However, a hotplate for coffee making can be cut in on the circuit when the batteries are furnishing electricity. By now the reader will have gathered that the crew lives aboard. Working on New York's coal supply, it is obvious that valuable vessels can not be tied up at night. Crew switching arrangements on boats of this type seems to be governed by conditions of operation and the convenience of



The Marine Section of the Cleveland Diesel Engine Division of General Motors Corp. designed this fine new addition to the Tracy tugboat fleet in New York Harbor. This is the main engine room with 16 cylinder Cleveland diesel in left background, Briggs filter in right background and Lakeshore Electric main switchgear in right foreground.

owners and men. We have never tried to understand crew working arrangements, but they do work out very well.

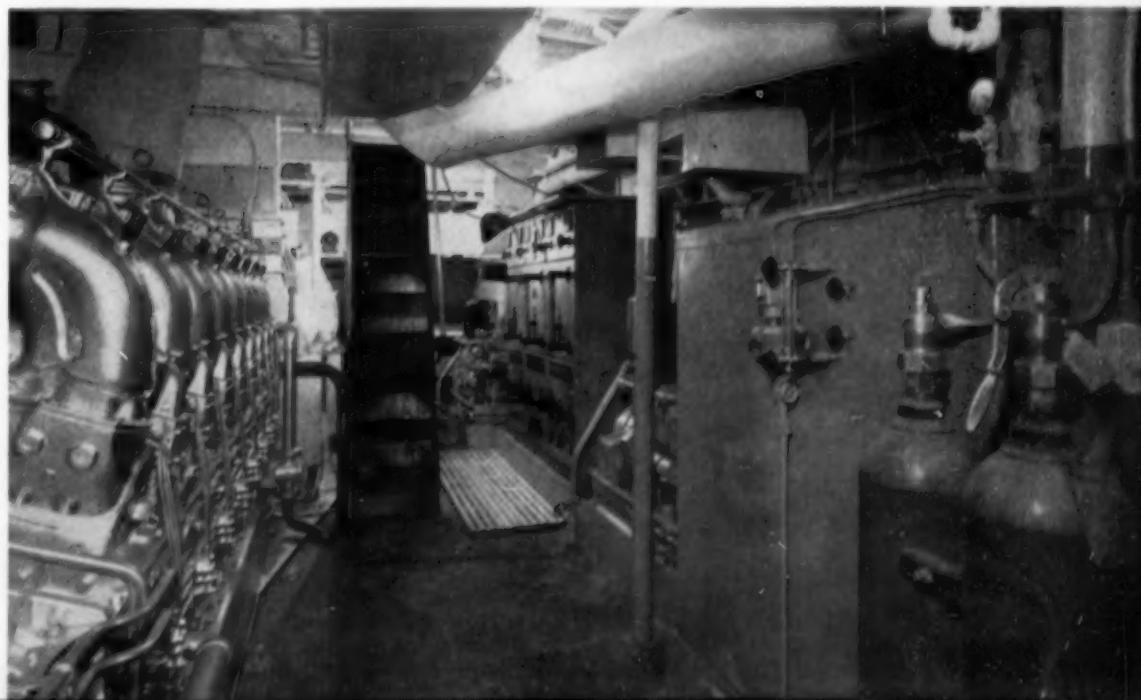
The pilothouse is roomy and comfortable. It should be noted that the deckhouses are quite high, giving ample visibility at all times. There is not the elaborate electronic navigational equipment found on boats in ocean towing service, although this one is quite equal to such work. A Ritchie standard compass in binnacle is the important element. The radio telephones include ship-to-shore and ship-to-ship and there is a GE mobile transmitter and receiver for contacting the office. A Carlisle-Finch searchlight and Cunningham air whistle are on top

of the pilothouse. Not too many frills are needed for work that seldom if ever takes the boat off New York Harbor. There is something about this *Kathleen C. Tracy* that we sometimes find on boats of all kinds and cannot account for it: The expression "big for its size" describes it. Senseless, of course, but very expressive and that is what we feel as we walk the decks of this fine new boat. She seems to be somewhat larger, more roomy and more generally comfortable than many tugs in the 100 ft range. Since most of the visitors who came aboard while the boat was on display in New York were former seafarers, there was quite a high percentage of them who said they would like to live aboard for a while. So would we.

List of Equipment

Main Engine—General Motors—Cleveland.
Main Generator—Allis-Chalmers.
Propulsion Motor—Westinghouse.
Reduction Gears—Farrel-Birmingham.
Auxiliary Engines (2)—General Motors—Detroit.
Auxiliary Generators—Delco.
Storage Batteries—Exide, Electric Storage Battery.
Starting Batteries—Delco.
Switchboard—McIntosh Electric.
Pilothouse Control—Lake Shore Electric.
Main Switchgear—Lake Shore Electric.
Steering System—Almon Johnson.
Lube Oil Filter—Briggs.
Gear Type Pumps—Viking.
Centrifugal Pumps—Goulds.
Heat Exchangers—Ross.
Steam Heat Boiler—Ross.
Air Compressors (2)—Ingersoll-Rand.
Electrical Tachometers—Weston.
Whistle—Cunningham.
Searchlight—Carlisle-Finch.
Compass and Stand—Ritchie.
General Alarms—McIntosh Electric.

The other end of the engine room with main engine in foreground and one of the Detroit Diesel auxiliary units in right background and partially in right foreground. Marquet governor on main engine can also be seen.



DIESEL engines are dependable and efficient prime movers when they are operated correctly. To keep them in top running condition and within their most efficient operating ranges it is necessary to have certain instruments to indicate when engines are running at their best economy levels and to warn of conditions that will cause engine damage. This article deals primarily with instruments for diesel applications in mobile equipment—trucks, busses, off-highway trucks, rubber-tired construction equipment like scrapers and graders, and crawler tractors.

First of all, the following basic instruments are needed on a diesel engine: lube oil pressure gauge, fuel oil pressure gauge, coolant temperature gauge, and ammeter if the engine has an electrical system for starting and for electrical accessories. These instruments are essentials that should be on all diesel equipment, and they should be designed so that the operator's attention will be attracted readily if something is wrong. This is done by suitable indication of danger zones on the face of gauge, or by warning lights connected with the gauge. Fuel and lube oil pressure gauges also are helpful in determining when to make filter changes.

If an engine is to be operated most efficiently and safely, a tachometer must be provided, particularly in connection with high speed engine applications in mobile equipment. There is a most efficient engine operating speed range where maximum torque and lowest fuel consumption lie, and only by use of a tachometer, which measures engine revolutions, can it be insured that engines are operating most efficiently as much as possible. The tachometer also benefits by indicating conditions of engine overspeed, which if prolonged can ruin the engine and endanger the vehicle and operator. This can happen in steep downhill runs with heavy equipment like off-highway trucks coming into a mine pit.

A device to accurately record the actual time of engine operation is also needed to insure the best operation of diesel equipment. This is very important in establishing sound and smooth running maintenance programs, particularly in large fleets of equipment, and also is very helpful in analyzing costs and times of specific operations for contractors, and for analyzing operations and schedules for truck and bus fleets. The best ways to measure



INSTRUMENTS FOR DIESELS

By BRUCE W. WADMAN

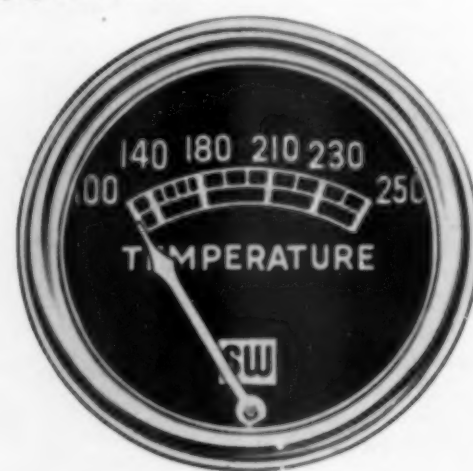
engine operating time are by measuring the actual hours of engine operation or by measuring the number of engine revolutions, and setting up programs on the basis of total revolutions. Both of these methods are accurate and will give good results if they are applied properly.

Now, a representative group of instruments that

are available today for measuring engine revolutions and operating time will be described.

First, there are a number of mechanical driven type tachometers on the market today, and they are well known. We will describe some tachometers here that have unique features that merit discussion. Stewart Warner makes a tachometer with an

Heavy duty Stewart Warner gauges for use on diesels.





Instrument panel for Kenworth heavy duty diesel truck. Kenworth has a minimum instrumentation which generally consists of a speedometer, tachograph, ammeter, engine lubricating oil pressure gauge, fuel oil pressure gauge, engine oil temperature warning light, engine coolant temperature gauge, air receiver pressure gauge, and brake chamber pressure gauge. This is good instrumentation for a diesel, and Kenworth also offers engine coolant pressure gauges, manifold pressure gauges (exhaust and intake) and exhaust manifold pyrometers and air intake temperature gauges if the customer so desires.

odometer which records and indicates total engine revolutions on the tachometer. This is a mechanically driven tachometer of the eddy type drive.

The odometer serves as an effective recording instrument for measuring engine operating time in terms of total revolutions. Electric tachometers are available for diesels and they offer advantages in diesel applications. Sun Electric Corporation makes an electric tachometer that operates as follows: a transmitter or sending unit is connected mechanically to the tachometer drive on the engine. This

sending unit is connected to a set of points which open and close in relation to engine speed, and control the output from the transmitter to the tachometer head. All connections from one unit to another are electrical and therefore, installation of the tachometer head in any position is relatively simple because you only have an electric cable for a connecting line and don't have to worry about a long mechanical connection. The power unit for the Sun tachometer is a self-contained mercury cell battery, which makes the tachometer electrical system entirely self-contained.

Stewart Warner also makes an electric tachometer which operates as follows: a transmitter or sending switch which is a single pole, double throw switch, is connected mechanically to the tachometer drive takeoff on the engine. For an electrical power source the battery of the engine is used. This electric tachometer can also be equipped with an odometer because the pulse motor in the tachometer head which drives the tachometer indicating mechanism and is powered by current from the sending switch, is powerful enough to drive the odometer mechanism as well as the tachometer itself. The electric cable connecting line can be as long as necessary and more than one tachometer head can be driven off the same transmitter.

Electric tachometers offer ease and flexibility of installation, which is important in modern equipment like cab-over-engine and cab-beside-engine truck tractors, where instrument panels are located in difficult angle positions in relation to the engine. Wagner Electric Corporation distributes an instrument called a tachograph, which is a recording type tachometer or speedometer. It is a precision instrument that records on a chart the speed of a vehicle in miles per hour or rpm, distance traveled, or total engine revolutions, running, idling or stopping of the engine. All of this recording is synchronized with recorded time. The tachograph contains an indicating tachometer and a clock and records on a graph located inside the instrument all of the above information. The tachometer mechanism is mechanically driven with a centrifugal type of drive setup. This device gives a very complete picture of engine operation. The information on the graphs can be used to determine whether or not vehicles are operated as efficiently as possible. Fleet supervisors can study and compare charts of runs and easily ascertain which require longest running time, which runs cause more erratic driving speeds, result in more delays, and where along the route on any run these conditions occur. This provides an excellent source of information for planning operations of all types—truck and bus operations, construction jobs, strip mine jobs, logging operations, etc. It also serves to keep operators of equipment more alert and conscious of operating their equipment most economically.

Another instrument to measure the time of engine operation is the Hobbs hourmeter. This precision

Stewart Warner tachometer with odometer to measure and indicate engine revolutions.

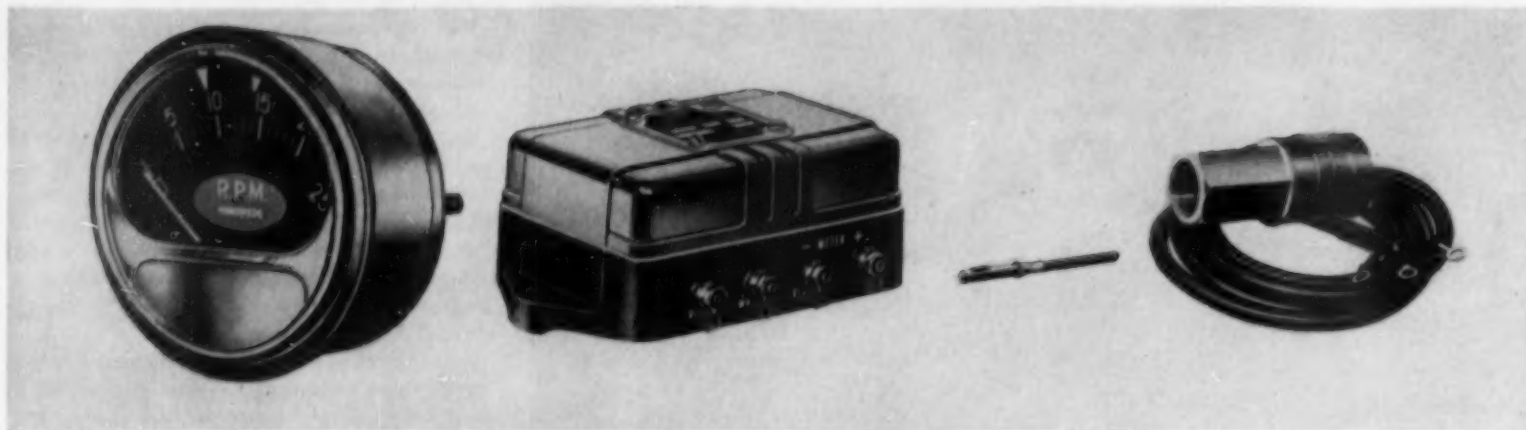


Hobbs direct reading type hourmeter.



Tachograph equipped with speedometer and clock. In the tachometer model of the tachograph a tachometer is installed in place of the speedometer.





Sun Electric tachometer system. From left to right: tachometer head, power unit, and transmitting unit.

instrument is an electrically wound clock. It is a true timing instrument and not a revolution counter. The hourmeter requires a battery as a power source, and is operated either by running on the ignition, or by an oil pressure switch connected to the engine lube oil system, which starts the meter when oil pressure in the engine builds up as the engine is started. The hourmeter comes either in a direct reading or pointer reading style, and can be most effectively mounted on the instrument panel. The hourmeter is valuable in giving an accurate record of actual engine operating time in hours.

Diesel engines in most mobile equipment applications necessarily spend a significant amount of time idling or at part load. Idling, especially for long periods of time, is very hard on diesels, and an accurate record is needed of either actual engine hours operated or total number of revolutions of the engine to have the most effective and practical maintenance and operating programs. A few typical applications will illustrate this need. With today's traffic congestion problem, trucks are forced to spend more and more of their operating time either idling or at low engine speeds. In a typical scraper operation on a construction job, the scraper may move along slowly picking up a load. When fully loaded, it may then run down hill and cover a much longer distance in shorter time with the engine working lightly. Later it stands with the en-

gine idling. These phases of engine operation are all important for maintenance records.

With so many large fleets of diesel equipment in operation today, it is more important than ever to have instruments on engines that will give a complete record of engine operation because competitive conditions make highly efficient use of diesels mandatory and large numbers of engines in an operation will run up operating costs fast if the engines are not kept in top running condition. The tachometer and an accurate device for measuring engine operating time are two instruments, that if used properly, will give enough information to insure diesel equipment operation at optimum economies. Of course, in highway vehicles, a speedometer is also needed.

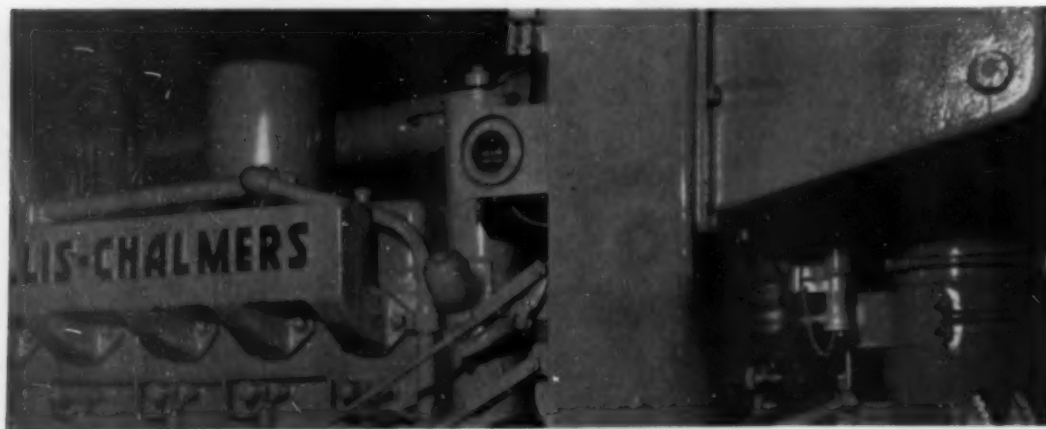
In talking about adequate instrumentation of engines in mobile equipment, it is important not to lose sight of the human factor involved. Instruments in themselves are of little use unless the operators of the equipment use them correctly. For example, if a truck driver consistently lugs a 2000 rpm diesel down to 700 or 800 rpm when going up hills, instead of shifting down to maintain the best engine operating speed range, the engine can be expected to require more frequent servicing and experience more downtime than would occur in normal operation on which maintenance and oper-

ating programs are based. The operator must do his part in taking advantage of the valuable information that his instruments give him. It will be well to emphasize here that proper placement of instruments on the panel plays an important part in driver attentiveness to them and contributes a great deal to insure correct use of instruments.

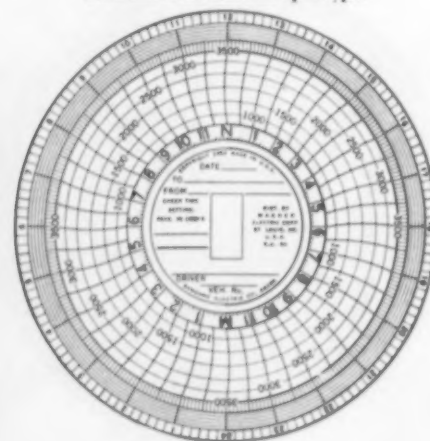
Instruments for diesel engines must be rugged and able to withstand a great deal of vibration and dirty outside air conditions. All of the instruments described here are specially designed to give long life in diesel equipment. Large instrument manufacturers make special shock resistant instruments for use with diesels. For example, Stewart Warner, one of the largest instrument manufacturers, makes a complete line of instruments for diesels and engineer complete instrument panels for use on dieselized equipment of all types. Stewart Warner gauges are of the diaphragm type and have heavy duty mechanism, with shock resistant linkage and fittings that won't take a set when overloaded, will withstand excessive vibration and up to 500 lbs. overpressure, and feature a very steady pointer with no bounce or flutter. The gauges are housed in dust-tight and waterproof cases also.

It is hoped that the information provided herein will be useful in contributing to better diesel engine and fleet operation.

Allis Chalmers HD 21 tractor showing Hobbs direct reading type hourmeter in center.



Indicating chart for the tachograph. This one is the 24 hour rpm type.



DIESEL TOWBOAT ARROWHEAD

By W. L. BODE

ON March 30, 1956, the Midwest Towing Company took delivery of the M/V *Arrowhead*, the first of two new 2400 hp twin screw towboats. Designed and built by the St. Louis Shipbuilding & Steel Co., the 150 ft by 33 ft 6 in. *Arrowhead* will be joined soon by her sister ship, the *Prairie State*. The hull is heavily framed both transversely and longitudinally with $\frac{3}{8}$ in. plating on the bottom and sides and $\frac{1}{2}$ in. plating at the bilges and tunnels. The bulkheads are $\frac{3}{8}$ in. thick, stiffened both vertically and horizontally. The easy stern lines permit a smooth flow of water to each of the 102 in. propellers. The pair of massive Kort Nozzles were designed for the heavy duty coal trade.

Two Cooper-Bessemer JS-8-T 13 in. by 16 in., 4 cycle turbocharged marine diesel engines provide propulsion. Each engine is rated at 1300 hp at 450 rpm, and through Falk reverse-reduction gears turn the four blade cast steel propellers at 180 rpm. Cooling of the main engines and generators is provided by circulating the jacket water through St. Louis Ship closed skin cooling ducts. Ross lube oil coolers and Wartenbe lube oil filters are also installed as engine accessories.

Two powerful steering systems of the St. Louis Ship mechanical-hydraulic type are installed on the *Arrowhead*. One system controls the two steering rudders and the other controls the four flanking rudders. The system is so designed that the rudders can be turned hard-over to hard-over in 12 seconds while towing. The towboat is equipped with two General Motors 100 kw 3/60/440 volt ac and 20 kw dc diesel generator sets. A dead front switchboard provides for control of the generators and distribution of power.

The 100 gpm Weinman Fire Pump, driven by a $7\frac{1}{2}$ hp Fairbanks-Morse motor with Cutler-Hammer controls, supplies four fire hose outlets. A Carver bilge pump driven by a 5 hp Fairbanks-Morse motor with Cutler-Hammer controls has suction connection from all hull compartments. A 5 hp Carver motor driven pump provides for the transfer of fuel oil between bunker tanks, while for pumping from bunkers to day tanks there is a $1\frac{1}{3}$ hp fuel oil service pump. Air for main engine starting, Airflex clutches and air whistle is furnished by two 23.5 cfm Quincy air compressors driven by 5 hp motors. Two double barreled capstans manufactured by Schoellhorn-Albrecht are each driven by a 10 hp Fairbanks-Morse motor with Cutler-Hammer controls. The two 15 ton hand winches located on the forward deck, are manufactured by Patterson Winch & Supply Co.



Profile of M/V *Arrowhead*.

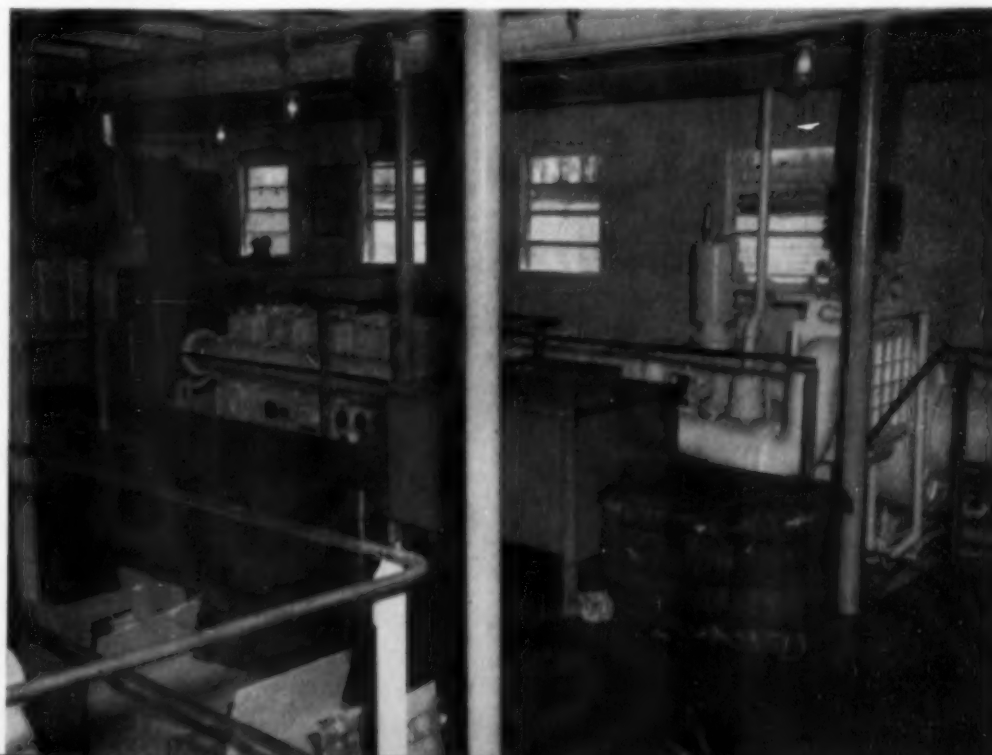
The spacious, modern deckhouse of the *Arrowhead* is of all-welded $\frac{3}{16}$ in. steel construction with steel partitions at the forward and after ends of the engine room. All exposed surfaces are insulated with 2 in. of Microlite insulation, and the lining and partitions throughout are $\frac{1}{4}$ in. tempered Masonite. The double hung steel sash and full screens are made by the Truscon Division of Republic Steel Corp. Except for the ceramic tile in the bathrooms, the floor covering throughout is Armstrong Cork, Greaseproof Asphalt Tile. The galley of the *Arrowhead* is fitted with the most modern equipment including a Hotpoint electric range, an 82 cu. ft Tyler Refrigerator, a 20 cu. ft Tyler Deep Freeze Chest, and an 8 cu. ft G.E. night refrigerator. Built-in cabinets with stainless steel

counters and a walk-in pantry provide ample storage space for the towboat.

The pilot house console contains the main engine and gear controls, two pairs of steering levers, tachometers and gauges. Two 19 in., 45 amp. Carlisle & Finch Arc Searchlights are located on the roof with controls from the pilot house. An 8 in. Trip-lex Kahlenberg Bros. air whistle is located on the pilot house roof. The Radar is Model CR104 and the Radio-Telephone, Model ET-8050-HF, both made by Radiomarine Corporation of America.

From the excellent performance displayed on her delivery trip, the *Arrowhead* should prove to be an outstanding pusher for the Midwest Towing Co.

Upper engine room showing one of the two Cooper-Bessemer JS-8-T engines, rated 1300 hp at 450 rpm.



MAKING MOLEHILLS OUT OF MOUNTAINS

By ARNOLD B. NEWELL

WHEN the motorist approaches New York City on Route 100, he traverses the broad expanse of Central Avenue and before realizing that he will have his troubles he no doubt notices the distinctive yellow color of mechanized, off-highway equipment on or near the roadway, bearing the name Edward J. Petrillo, Inc. What he sees would be some of the 305 pieces of dieselized equipment that are employed or have been used recently on one of 27 construction projects at a total contract price of \$47,800,000. Whatever the inconvenience may be for the time being, the motorist charges it to the thruway and marvels at the mountains of stone and the never-ending movement of machines endowed with the needed force required to dislodge and mould into useful roadways the varied earth all around them.

It so happens that this one \$15,000,000 contract is out in front of the main office in which and from which an executive staff of about 50 people directs the far-flung activities of this fabulous company headed by Mr. Edward J. Petrillo who says his team is manned and equipped to dig, drill, blast and build anything anywhere. That this is no idle boast is revealed in the names of some of the more important recent projects on which the company has worked. And, by the way, the field of activity extends from the shores of the Great Lakes to the Atlantic Ocean and from Maryland to Maine, with an occasional side trip a little farther afield to, say, Florida. Of major importance has been the New York Thruway work for which the combined contracts have totaled \$24,356,140. Somewhat similar work for the Maine Turnpike Authority amounted to \$2,200,000. Not all jobs are reckoned in terms of millions, however, and as a fair example of the smaller projects we cite trolley rail removal and

installation of macadam pavement in the Bronxville-Tuckahoe locale for only \$60,000.

Dieselized equipment on projects big and small is now taken for granted. The diesel engine contributes one essential element without which no general contractor could expand as this one has done. This element is operating economy and efficiency. As evidence of the truth of this statement we present some corporate opinions regarding successful bidding, as follows: "The vast majority of our contracts were won the hard way—by being the low bidder. The fact that in each instance we also successfully completed the obligation—stayed in business—and prospered is proof that bidding is two-way-good. It is good for those authorized to issue such contracts and good for the one who stands up to the lowest guaranteed price. The sum of performance builds a responsibility and a reputation just as profoundly as it builds structures. The measure of these assets is not to be evaluated in dollars but rather in collective customer confidence which once gained must forever be maintained."

To say that the dieselized equipment is entirely responsible for success would in no way reflect the opinion of top management who remain ever respectful of the pick and shovel. None the less we list the dieselized equipment, and this tabulation does not include a vast array of rollers, graders, overhead loaders, trailers, pumps, rock drills, dust machines and a complete roster of construction miscellany where some diesels are also found.

Edward J. Petrillo is the president of both the company bearing his name and the Yonkers Contracting Company, Inc. Both of these are the outgrowth of a Carlo Petrillo Company launched by



This Euclid loader piles 15 yards into the bottom-dump wagon in 25 seconds while the LeTourneau-Westinghouse dozer keeps it moving. No time is wasted here as earth flows like water in to the waiting Euclid bottom-dump wagon.

An Allis-Chalmers dozer makes quick work of handling rock to be used for grading.



his father in the early 20th Century. Edward, in the mid 20s, joined the business and became vice president when the expanding organization was incorporated as the Mount Vernon Contracting Corp. With continuing success in 1944 Edward J. Petrillo became an auxiliary business in heavy construction. He resigned in 1945 from the Mount Vernon affiliation and organized the Yonkers Contracting Co., Inc. In 1947, for the purpose of establishing the proper balance between construction performance and equipment necessary thereto, the firm of Edward J. Petrillo, Inc. came into being with a high-efficiency pool of up-to-the-minute construction machines, mobile and usable to maximum effectiveness. The pool as it stands today is as follows:

DIESELIZED EQUIPMENT

Make and Type	Diesel
20 Northwest 2½ cu yd shovels.....	Murphy
12 Northwest 1½ cu yd shovels.....	Murphy
10 Northwest ¾ cu yd shovels.....	Murphy
9 P & H truck cranes.....	P & H
32 Allis-Chalmers HD20 dozers.....	Allis-Chalmers



20	Allis Chalmers HD15 dozers.....	Allis-Chalmers
20	Euclid bottom dump wagons.....	Cummins
25	Euclid rear-dump trucks.....	Cummins
25	Mack trucks 12 cu yd.....	Mack
35	Ingersoll-Rand 600 cfm compressors.....	GM 6-71
10	LeTourneau-Westinghouse dozers.....	GM 6-71
2	Euclid 1000 cu yd/hr loaders.....	GM 6-71
27	LeTourneau-Westinghouse self-propelled scrapers	GM 6-71
6	Allis-Chalmers HD20 dozer- loaders	Allis-Chalmers

It is obvious that the equipment must not only operate efficiently but also be maintained in tip-top shape to keep up that efficiency. To this end there are two major procedures. One is to take along all the essential maintenance facilities for each operating area and the other is to return to headquarters in Yonkers any machinery that needs more extensive rehabilitation than can be done in the field. Complete facilities for all maintenance and repairs are a part of the total equipment. There are two branch divisions under field supervisors, one in New Jersey and one in New England.

The scope of the undertakings is perhaps best indicated by a brief recapitulation of the classes of work. They embrace, in addition to superhighways, work on shopping centers, installation of electrical ducts, army camp grading, sewage plant excavating and fencing, air force base grading and drainage, post office complete construction, grading, housing, natural gas line excavations and other projects.

When sheer ability to pick it up and carry it away is of the essence these Allis-Chalmers T5 300 scrapers are mighty handy pieces of earthmoving equipment.



DIESEL TUG "GRAMPUS"

By MICHAEL T. PATE

THE *Grampus*, latest addition to the harbor and deep sea towing fleet of G & H Towing Company, Inc., of Galveston, Texas, brings to Gulf waters one of the largest tugs south of Baltimore, and one which is ultra modern in every respect. Measuring 105 ft in length, with a beam of 27 ft, the tug carries a single diesel, rated at 1700 hp, which will drive it, fully loaded, at a speed of approximately 13½ knots. Designed to undertake long ocean voyages, with a supply capacity for 30 days away from port, the *Grampus* is expected to see much service in Gulf of Mexico waters in the shifting and servicing of the offshore drilling barges and other nonpowered floating equipment which the oil industry is employing in large numbers in its search for oil and natural gas along the Louisiana and Texas Continental Shelf.

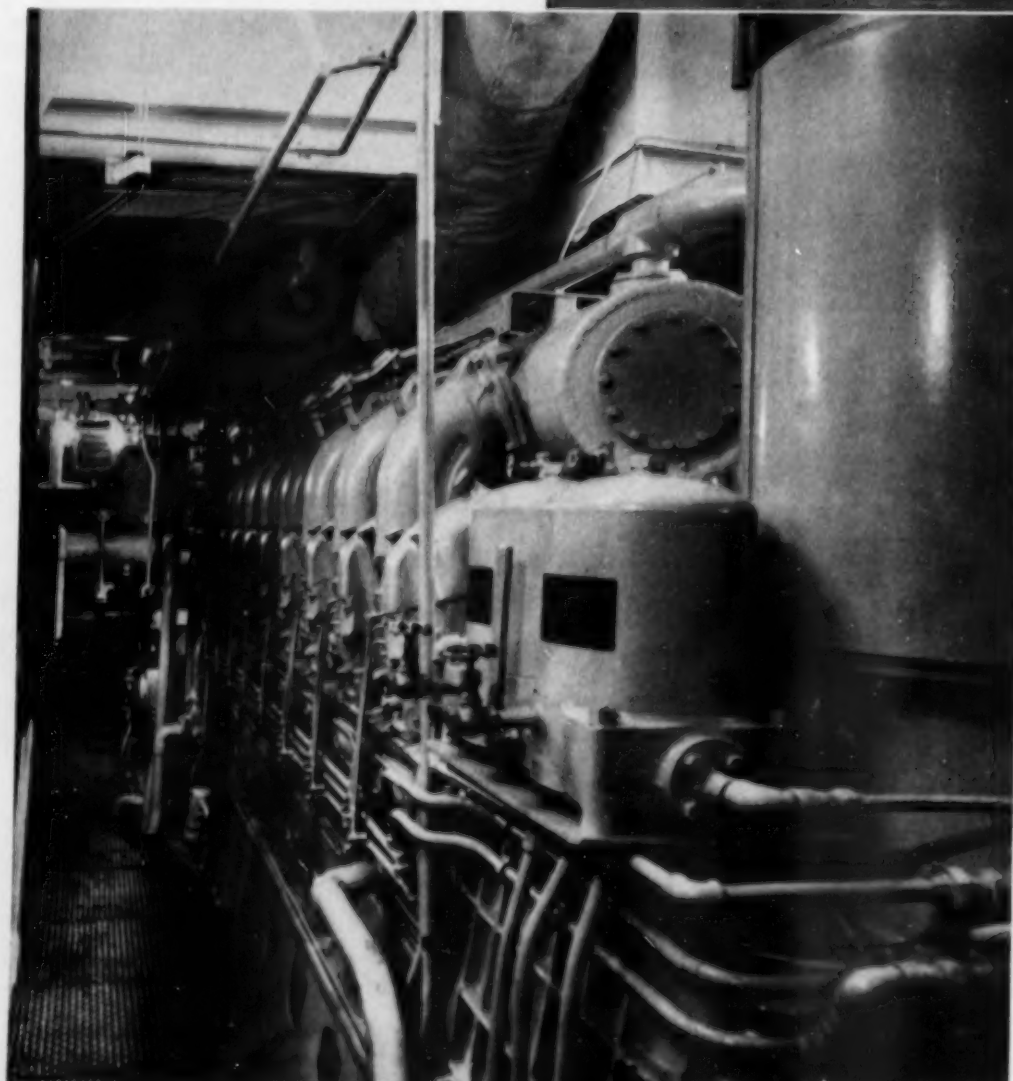
The *Grampus*, custom built to G & H specifications by Gulfport Shipbuilding Corporation, Port Arthur, Texas, is constructed to standards of the American Bureau of Shipping, the U.S. Coast Guard and the U.S. Public Health Service. She has an all-steel hull with a molded depth of 15 ft, a net weight of 135 tons, gross weight of 197.5 tons, and displacement of 439 tons.

The tug is diesel equipped throughout. The main engine is a 1700 hp General Motors, 16-cylinder Cleveland diesel, equipped with air clutch and driving through a Falk reversing and reduction gear to a 9½ ft three bladed propeller. All equipment is electrically powered, from current provided by either or both of the two General Motors 6-71 diesels direct-connected to 60 kw ac generators, one mounted along the hull on either side of the main engine. Either of these units is ample to provide for all the electric requirements of the tug, including driving the towing winch, furnishing current for the all-electric galley, and powering the steering motor which makes the tug's rudder, 14 ft deep by 6 ft in width, readily swung through its full operating arc. To provide greater mobility, the arc on either side of the center line has been increased 10 degrees over that normally provided in tugs.

The tug is air-conditioned throughout. Twin compressors, mounted along the hull at the right side of the engine room, provide ample capacity for the hottest day, with either unit ample for meeting normal cooling requirements of the vessel. Sleeping accommodations include three staterooms topside and four below, in addition to which there is an owner's room for housing members of the firm

when they accompany the tug. Normally carrying 11 men as complement, the *Grampus* can easily sleep 15 men, and the all-electric galley has capacity to provide three hot meals a day for that number. Large and powerful enough to travel any of the Seven Seas, the tug carries sufficient fuel, fresh water and stores for a 30-day voyage without touching port, computed with the main propulsion diesel operating at full power over that period.

The wheel house is modern in every way. The wheel carries a standard compass, and is equipped with gyro compass so that it is not necessary to unship the automatic pilot to change course—enabling the tug to be steered by hand in close quarters or heavy seas, and immediately put back on automatic steering when conditions permit. A model 105A radar set, mounted behind the wheel, is adjusted so as to show the full 360-degree sweep and may be set to show 1, 3 or 5 mile circles. An 85 watt RCA ship-to-shore radio-telephone flanks the radar, and is in turn flanked by the fathometer. This Bendix depth recorder may be set to show actual depth of water, or may be adjusted to show the exact depth below the tug's forefoot. All speeds, forward and back, are controlled through duplicate units resembling the usual ship's engine-room tele-



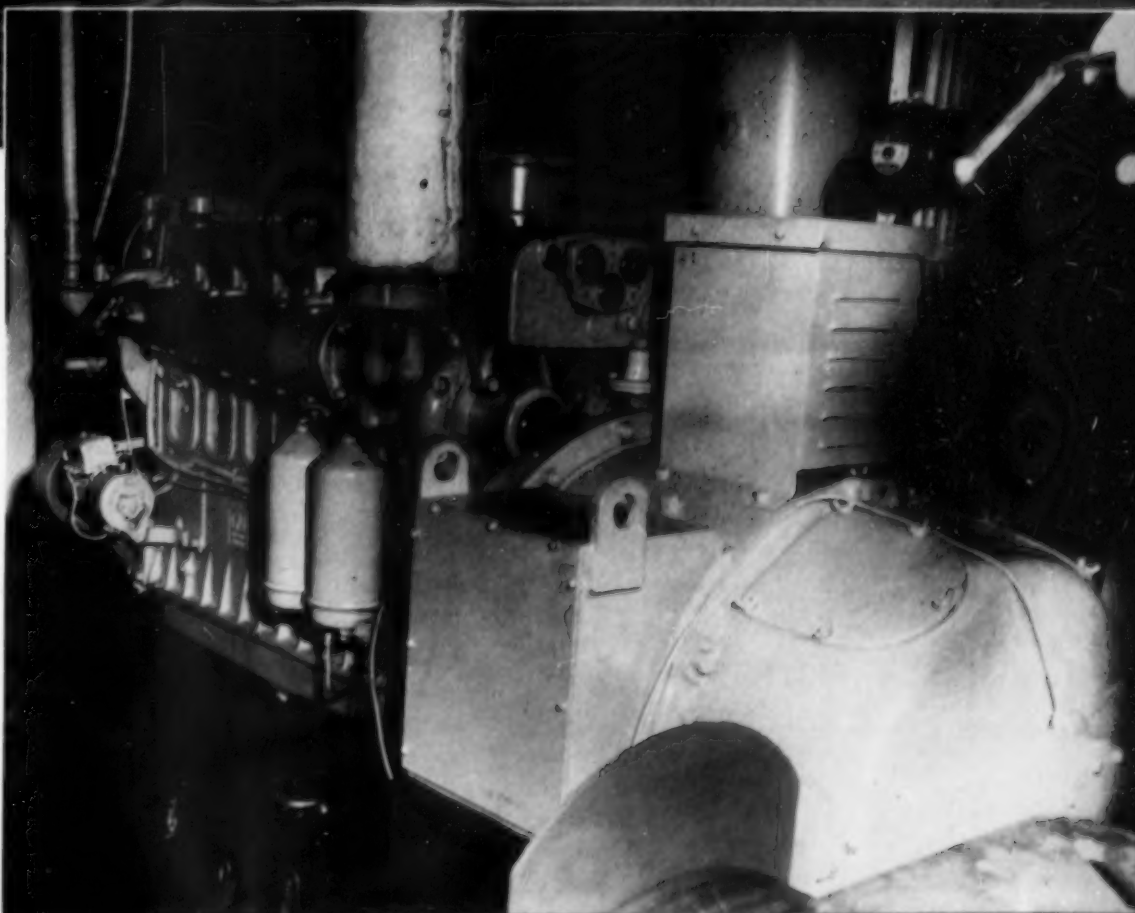
Looking down the right side of the main propulsion diesel from the foot of the companion way to the main deck. The exhaust, top center, is carried to a riser within the tug's main funnel, terminating in a spark-arrester type muffler near its top.



graph: ope mounted on either side of the wheel and binnacle of the tug.

A complete modern fire protection system is incorporated in the tug's design, and the Towing Company's regular safety training program has been expanded to include thorough grounding in the handling of this equipment. Following completion of the sea trials of the *Grampus*, Captain N. G. Orange was named to command, with R. C. Anders named chief engineer. The tug is based at the company's Galveston headquarters, but may be assigned to either Houston or Corpus Christi operations on demand.

The right hand General Motors diesel, driving a 60 kw, ac generator and serving as stand-by power or alternating in furnishing all except propulsion power to the tug. Space is provided in the method of mounting to allow the pan to be dropped for servicing.



WOODBINE, IOWA

By DOUGLAS SHEARING

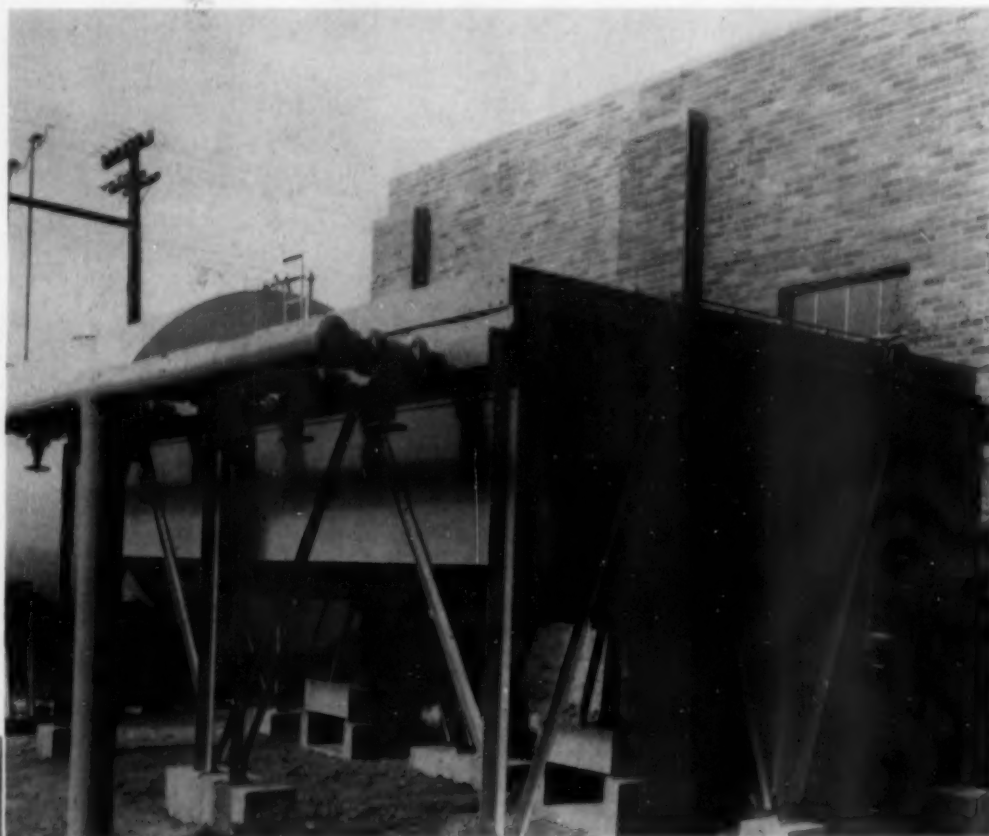
ANY housewife of Woodbine, Iowa, who finds she has a frayed lamp cord or a stalled washing machine to cope with, generally looks out of the window to see if the municipal power plant's service truck is coming down the street. Whether it be the plant superintendent, the lineman, or one of the plant's three operators, Mrs. Housewife can count on him to stop in and put things to rights again before continuing on his way. Lest it be said that that's no way to run a power plant, the office manager at the plant, a lady, is perfectly capable of operating the plant if the regular operator is busy with a maintenance job or is out in town generating good will. The utility staff, of course, has a full-time job operating and maintaining four Fairbanks-Morse Model 32E14 straight oil diesels and a new 8-cylinder opposed-piston unit that was installed in October, 1954, but it has made a habit of lending a helping hand to the people of Woodbine and the community as a whole since the plant started in 1941. At this plant, the concept of service starts with the primary task of providing a dependable supply of electricity at moderate cost, then extends to helping the customers get full satisfaction with the power they buy. In addition to the power plant, the staff operates the water system, sewers and public parks of Woodbine and when Christmas approaches each year it turns out in force to string decorative lights over the city's streets. The plant supplies current for the lights during the holidays without charge and when the holidays are over, the staff takes the lights down again in the same spirit of cooperation. Throughout the year, the plant lights the city's athletic field when there are night games on the schedule and sends a man to handle the switches for only \$10 a night. It lights the city's skating rink and supplies free extra current for religious or civic meetings in the community of Woodbine.

While the power station people are exceptionally generous with their time and effort in the community, the power plant, their main concern, is operated with notable efficiency. The plant was started in 1941 when the community decided that

a municipal power station would provide more dependable service at lower rates. The plant was built on the city's main thoroughfare and equipped originally with three F-M Model 32E14 diesels, one unit rated at 300-hp and two at 225-hp each, developing rated power at 300 rpm. At that time, the city thought this equipment was adequate for any load in the future. However, more and more residences were wired, more electrical appliances utilized and the number of industrial users of power climbed to an unexpected high. Consequently, the city installed an additional F-M Model 32 of 450-hp in September, 1949, to supply additional current for consumer demands.

In spite of Woodbine's stable population—holding at 1300 over the last decade—power demand continued to increase. By 1953, the demand was more

than 300% per capita above 1941 levels and still going up. A survey showed that the largest unit in the plant operated 6,408 hours or 74% of the time. A further investigation showed that only during 26% of the time could combinations of the smaller three units handle the load. These findings induced the utility's Board of Trustees to approve the purchase of a fifth F-M engine, this time an 8-cylinder opposed-piston unit, and it was installed in October, 1954. The new OP, rated 1120 hp at 600 rpm, brought plant capacity up to 2320 hp making it possible for the plant to handle peaks of 1568 kw. In a test run of 8 hours under a 350 kw load, less than half engine capacity, the OP produced 13.08 kw hrs per fuel gallon and bettered it with 14.12 kw hrs under a $\frac{3}{4}$ load. Operating for only 10 weeks in 1954, the OP produced 16% of the plant's total kw hrs for the year. The surprising increase



➤ In the Woodbine plant's cooling system, this Young dual radiator brought plant consumption of power down from 15,000/16,000 kw hrs a month to 5,000 kw hrs a month. Automatic controls turn one fan on at low speed, then the other at low speed, then one at high speed and then the other at high speed.

➤ The Woodbine, Iowa, municipal power plant people cooperate on almost everything in the city's affairs, from fixing a neighbor's washing machine to maintaining the water system, sewers and parks throughout the year. The plant operates four Fairbanks-Morse Model 32E14 diesels, totaling 1200-hp and a new F-M 8-cylinder, opposed-piston unit of 1120-hp.



in power demand is due in a large part to the Woodbine plant's dependability as an energy provider and to its moderate rate schedule. For example, in 1941 there were 11 electric water heaters in the community, operating during off-peak hours. Because the power supply was so dependable, the number grew by 1953 to 305 heaters that are permitted to operate at any time in the 24 hr period. The plant's management says modestly that luck had something to do with its reputation for dependability—it hasn't had a line interruption since a storm toppled some lines in 1945—but it's a matter of record that the plant has never had an engine failure in its history.

Since natural gas for fuel is unavailable, Woodbine operates exclusively on oil. It uses a 50-50 mixture of Caesar crude oil of 22 to 24 gravity, costing .1088 per gal. delivered, and a heavy cycle gas oil of 20 gravity, at .0831 per gal. delivered. Heavier fuel can be used if necessary. The engines are checked every weekend. Maintenance men clean the fuel nozzles and other working parts as a routine efficiency measure. Pistons are pulled once a year and a complete record kept on wear, maintenance, compression and the performance of each engine. Jacket water is circulated through the OP and a heat exchanger by a centrifugal pump mounted on

plant use of power. The plant used to run seven motors on the cooling system and consumed 15,000 to 16,000 kw hrs per month. The dual radiator runs about 15 minutes each hour, and has reduced current consumption to 5000 kw hrs per month. Controls start one of the two radiator fans at low speed, then the other on low speed, then one on high and then the other on high speed. Intake air is cleaned by a self-cleaning revolving fan that can be set for one revolution in 12 or 24 hours. Air is then drawn through an intake silencer. Exhaust noise is dampened by a vertical silencer outside the building. Plant operation is very quiet, creating no noise problem at its location on the city's main business thoroughfare. The OP has a separate gauge and alarm panel. Horn and red light alarms signal personnel whenever there is a drop in fuel, lube or water pressures or a rise in temperatures. There is also a horn and red light alarm on the high day tank level indicator.

Being both an efficient producer of power and a remarkably good neighbor in the community, the Woodbine power plant is a natural financial success. Its original bond issue of \$115,000 was paid off in just eleven and one half years, four years ahead of schedule, and the product it manufactures—electricity—is the only thing the people of the

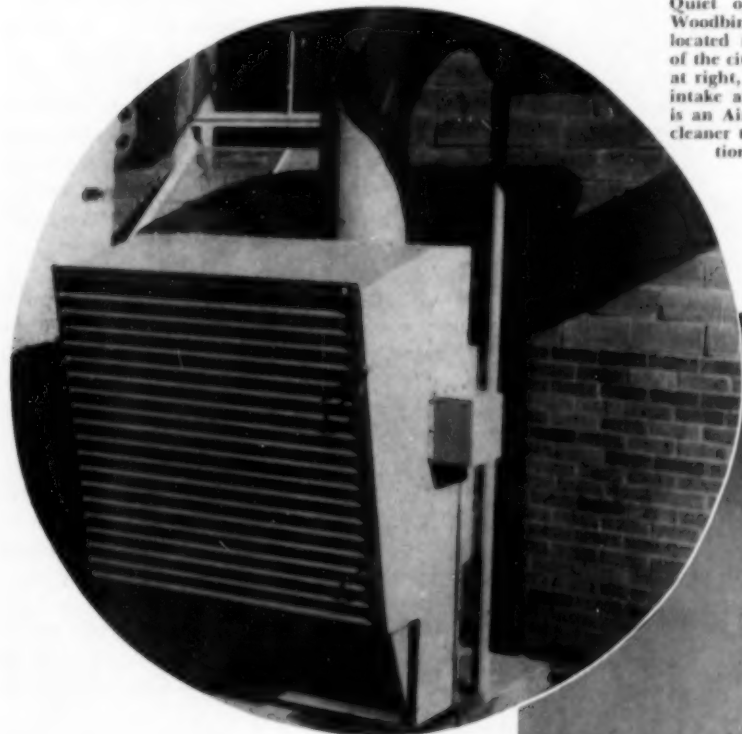
community can buy today that is lower in price than at any time in the last decade. A more tangible sign of its financial success was a new whiteway which the utility purchased and installed in the community's business district at a cost of \$10,000. The whiteway replaced 28 old street lamps with new electroliers using 300 watt lamps, and the utility maintains the new electroliers at no extra cost to the taxpayer. The plant has given an estimated \$33,000 to the city to date in free services and lighting equipment. But that is only a minor part of the services which Plant Superintendent Otis M. Dean and his staff have rendered to the customer-owners of the Woodbine plant.

List of Equipment

Engine—Fairbanks, Morse, 1120 hp, 8 cylinder, opposed-piston 600 rpm, straight oil diesel.
Alternator—Fairbanks, Morse 784 kw, 2400-v, 3-phase, 60-cycle, 80% pf, V-belted, 10 kw exciter.
Radiator (Dual)—Young.
Governor—Woodward.
Fuel filter—Nugent.
Lube oil—Sinclair.
Lube oil filter—Air-Maze.
Lube oil purifier—Hilco.
Oil cooler—Ross.
Lube transfer pump—Barnes.
Heat exchanger—Ross.
Air cleaner—Air-Maze.
Intake silencer—Air-Maze.
Thermostatic valves—Amot.
Gauges—Marsh.
Pyrometer—Alnor.

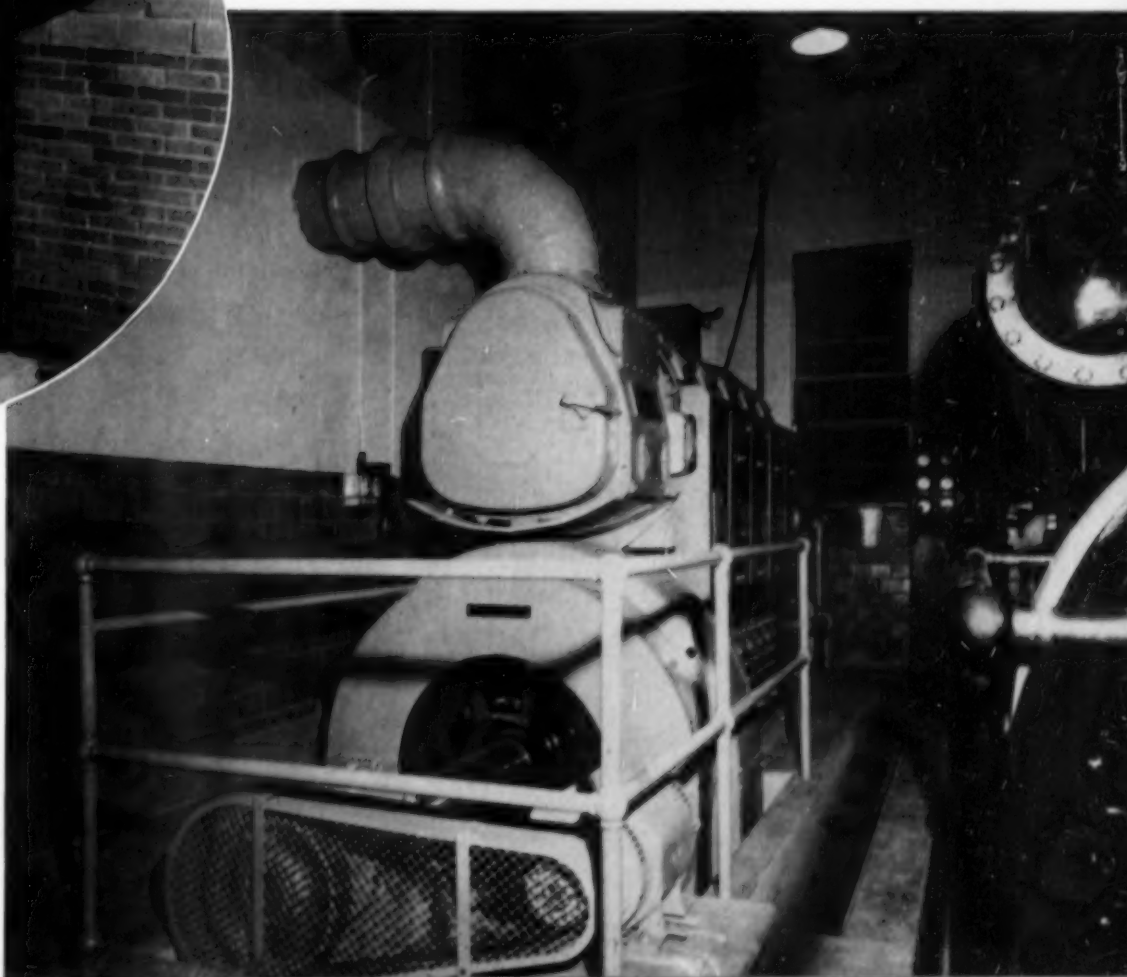
Quiet operation is essential to the Woodbine, Iowa, power plant, which is located in the main business district of the city. An Air-Maze intake silencer at right, not shown in picture, reduces intake air noise. Equipment in center is an Air-Maze self-cleaning intake air cleaner that can be set for one revolution in either 12 or 24 hours.

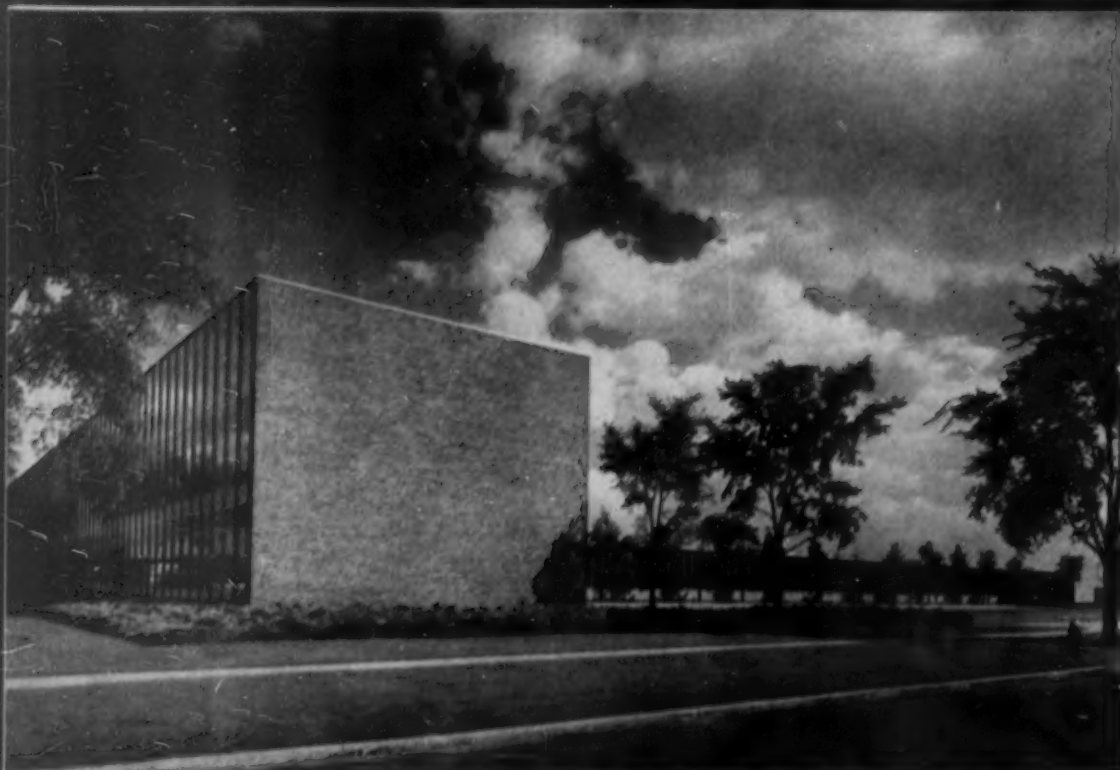
The new F-M 8-cylinder, opposed-piston engine, rated 1120 hp at 600 rpm, installed in the Woodbine, Iowa, municipal power plant in October, 1954. The unit generated more than 16% of the plant's 1954 total capacity in just 10 weeks of operation.



the engine. Automatic thermostatic valves maintain prescribed temperature for the jacket water. The Model 32s are all on a common jacket water header supplied by two centrifugal pumps. City water is used when make-up is needed. A softener for the make-up water for both the OP and the Model 32 engines' cooling systems softens water 3500 to 7000 gpd. Between August and October, 1954, only 55 gallons of make-up water were added to the cooling system.

Introduction of a dual radiator with automatic control feature has effected a notable reduction in



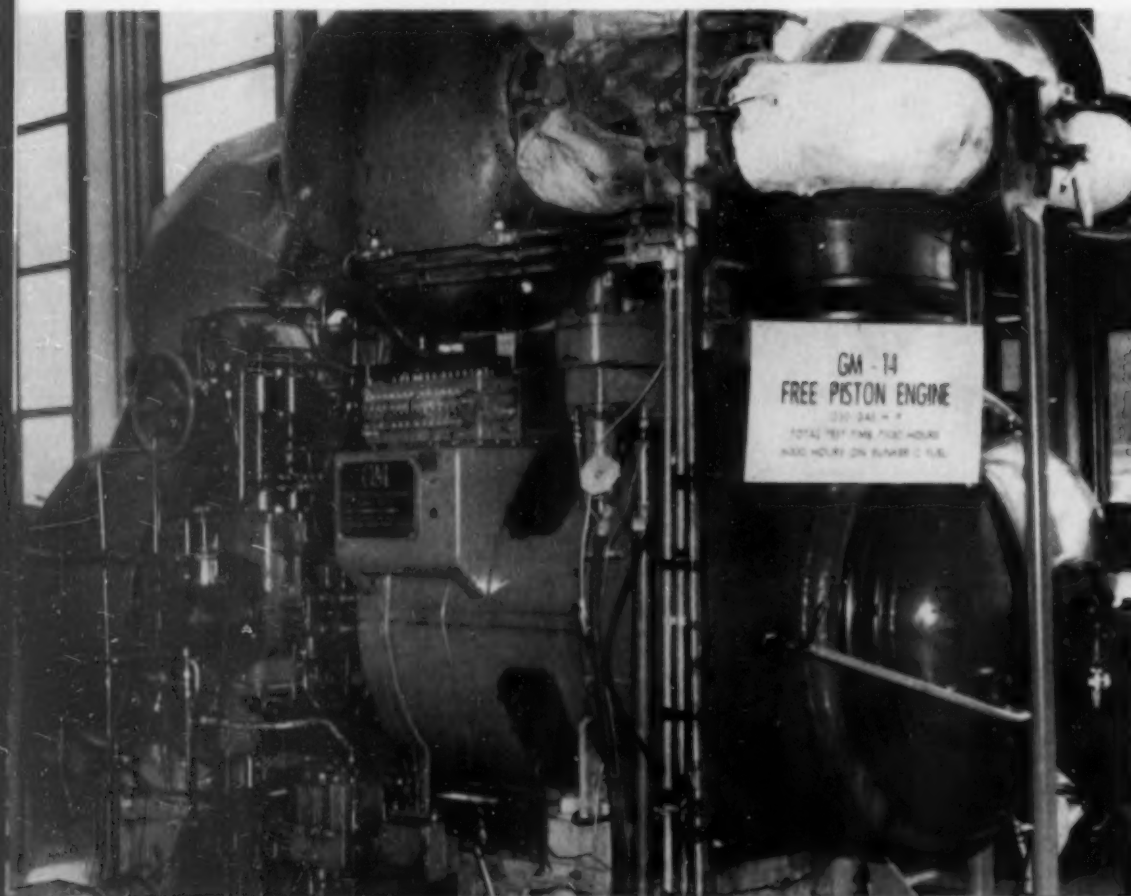


Headquarters of General Motors Engineering Staff are these administration and shop buildings, first completed in the multi-million dollar GM Technical Center project. The administration building end wall (left) is bright crimson glazed brick. This staff specializes in development of automotive engines, bodies, suspensions, transmissions and other components.

GENERAL MOTORS TECHNICAL CENTER

By JAMES W. BROWN

Experimental Free Piston engine displayed in the research building at the new GM Technical Center. Card on the engine reads: "GM-14 free piston engine, 1250 Gas hp; total test time 7500 Hours (6000 hours on bunker C fuel)."



IT was uncomfortably cold and windy in Detroit on May 16th when General Motors threw open the gates of its beautiful new industrial research center four miles north of the city to 5,000 invited leaders of industry, business, the sciences, education, government, and the press.

Dedicated to a better tomorrow through research today, the 25-building, 300-acre General Motors Technical Center is a significant contribution to the technological advance of our country. Costing over \$100,000,000 the recently completed facility is an architectural achievement of steel, aluminum, glass and multicolored glazed brick buildings. The buildings are grouped around a 22-acre artificial lake in which beautiful fountains spurt more water than the famed fountains of Versailles high into the air. The main buildings have many whole walls of huge windows offering pleasing vistas of lawn, lake and shrubbery. The walls which are opaque are of various shades of blue, red, yellow, orange, violet—even of black glazed brick. Inside, the buildings make use of color in wood, tile, stone and baked enamel surfaces. Every type of new material from plastics to stainless steel, is used for buildings and their furnishings.

The buildings offer a great variety of staircases including one which is suspended by slender rods of stainless steel alone, but which vibrated only a trifle when we trod it in the company of hundreds of other visitors. On the second floor of the Styling Administration building there is a circular room decorated in warm, vivid colors which surrounds a glass-enclosed, ceiling-high, skylighted blue-green fountain. We passed through central corridor after central corridor, all opening on spacious, sunny workrooms for styling experts, engineers and artisans. This new laboratory of science is aptly called the place where today meets tomorrow.

Formal dedication of the Technical Center took place in a temporary amphitheatre erected on the shores of the centrally-located lake. On a covered speakers' stand facing the general audience were seated the former President of General Motors who is now Secretary of Defense, C. E. Wilson; Albert Bradley, Chairman of the Board of General Motors; C. F. Kettering, former head and now a consultant of the research division; Dr. Lawrence R. Hafstad, well-known atomic physicist and now GM vice-president in charge of research, and many other notables including Army, Navy and Air Force brass. Harlow Curtice, President of General Motors made a spectacular entrance, driving up in front of the stand in the gas-turbine driven GM Firebird, to begin the ceremonies.

As the principal speaker, Mr. Curtice outlined the reasons for the construction of the research center and paid tribute to Alfred D. Sloane, C. F. Kettering and C. E. Wilson for having fostered what he calls the inquiring mind, which leads to discoveries making life easier and better for everyone today. He mentioned as some of the accomplishments pioneered by General Motors the automobile starter, tetra-ethyl lead for automobile fuels, the light-weight two-cycle diesel engine, automatic transmissions and the high-compression V8 engine.

In speaking of the diesel engine, Mr. Curtice said that GM research on the diesel began as far back

as 1928. He reminded his listeners that the railroads of this country are being saved \$6,000,000 a year in fuel alone by dieselization. Mr. Curtice also mentioned the new free-piston engine as an idea which is not new, but which (in conjunction with a gas turbine) has been adapted to an experimental automobile by General Motors for the first time and which may develop into the automotive engine of the future. Mr. Curtice characterized the research activity as complex and inter-related. As an example, he told how an idea for an automotive supercharger wound up as a wobble-plate motor for automotive air-conditioning.

Following Mr. Curtice was Dr. Lawrence F. Hafstad who said that in his opinion America had better start putting more emphasis on the studies of mathematics and science which in too many schools have been classed as elective rather than as required subjects. He said "We should realize that we will either have to study mathematics and the sciences or Russian."

C. F. Kettering, famed inventor of the electric starter and long-time leader of GM research activities said "I saw all of this start in a barn-loft down at Dayton. What we have here is just a new home for what has been going on in General Motors for many, many years."

C. F. (Boss) Kettering told the audience he felt that too much attention is paid to history. "We keep looking back at history so much," he said, "that we back into the future."

Closing the formal part of the ceremonies, President Eisenhower spoke for the occasion. His talk was part of the televised proceedings and was piped into Detroit. A huge portrait of the President was unveiled before the Detroit Technical Center audience as President Eisenhower was being introduced by Mr. Curtice.

After the ceremonies, buses conveyed the visitors from the stands to the main buildings housing the Styling, Research, Engineering and Manufacturing Process Development buildings. Time would not permit any one person to see all of the exhibits in one afternoon so we concentrated on the Research building. We felt a little more at home in one section of the research building where we found displayed two live models of the free-piston engine. Essentially, this is a diesel engine without piston rods or crankshafts, operated either as an air compressor or as a gasifier to furnish propelling gases to operate a turbine.

In his talk, Mr. Curtice had emphasized that by no means all of General Motors research was done or would be done at the technical center. He mentioned the independent research being done all the time by the various Divisions and said that the Divisions and the Research people work both independently and cooperatively, feeding the results back and forth to be accepted or rejected, as they choose. In the new General Motors Technical Center conditions and equipment for carrying on extended automotive and industrial research have been provided in as nearly ideal a fashion as is possible. The work done here will be a definite assist to the various General Motors Divisions and to the country as a whole.



This east-to-west perspective shows the striking architecture of General Motors Research Staff administration building with its glass walled lobby entrance facing southward at the GM Technical Center site. It houses major administrative offices, 250 other offices and laboratories, 126-seat lecture hall, a 24,000-volume technical library and cafeteria for 240.

Early on the morning of the Technical Center Dedication Day Detroit Diesel Engine Division, like all other divisions of the corporation, was decked out in flags and bunting for an Open House to celebrate the occasion.



FLUID DRIVE FOR DIESELS

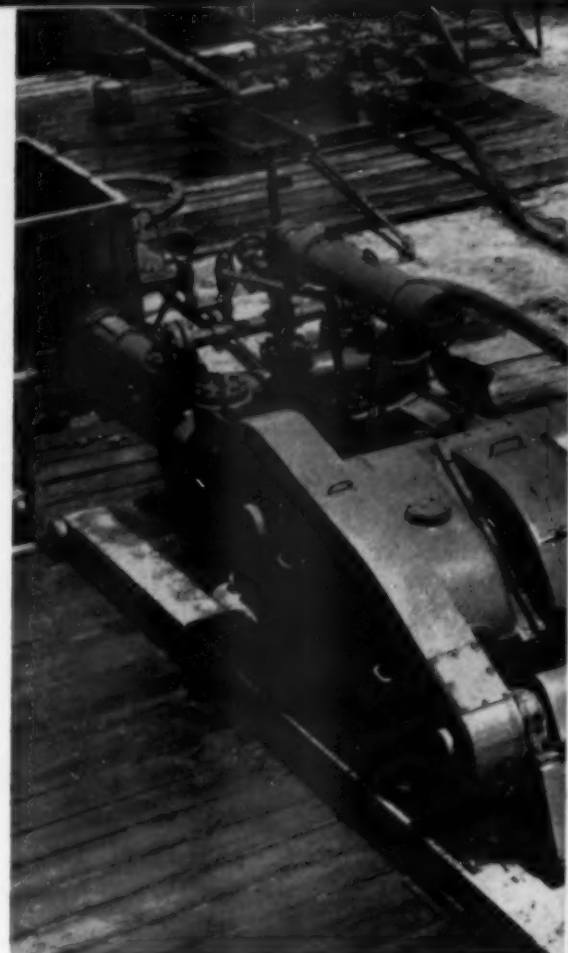
American Blower Adjustable Speed Gyrol Fluid Drive Is A Complete Packaged Unit Specifically Designed For Diesels.

THE Gyrol fluid drive, Type VS, Class 2F recently introduced by American Blower Corporation, is a development of importance. Although Gyrol fluid drives have been used with diesels for more than 15 years, the new Class 2F design is the first packaged, self-contained adjustable speed unit specifically designed for diesel application. It incorporates the same principles of construction but is more ruggedly built to meet heavy-duty service requirements normally associated with diesel installations. The packaged concept allows (within the ratings of this fluid drive) freedom in the matter of diesel engine and accessory equipment selection. This is of particular value to oil rig manufacturers. The new Gyrol fluid drive is capable of being incorporated into new oil rigs and can be readily adapted for installation on existing rigs. The same installation flexibility also applies to other diesel applications.

With Class 2F fluid drive, it is possible to start smoothly from a stand-still against a full connected load simply by advancing the engine throttle. The rate of acceleration is easily controlled by the rate of throttle advance. Acceleration may also be controlled by means of the scoop tube of the fluid drive itself. This provides maximum flexibility in selecting the correct drive speed for optimum oper-

ation without danger of killing the engines. Such control results in conservation of engine power. Class 2F Gyrol drives can be adjusted during operation to provide increased slip. It is therefore possible to extend the range of output speeds to a very low rpm, below the minimum engine speed, without danger of stalling the engine. Under all conditions, maximum power is smoothly exerted without danger of stalling.

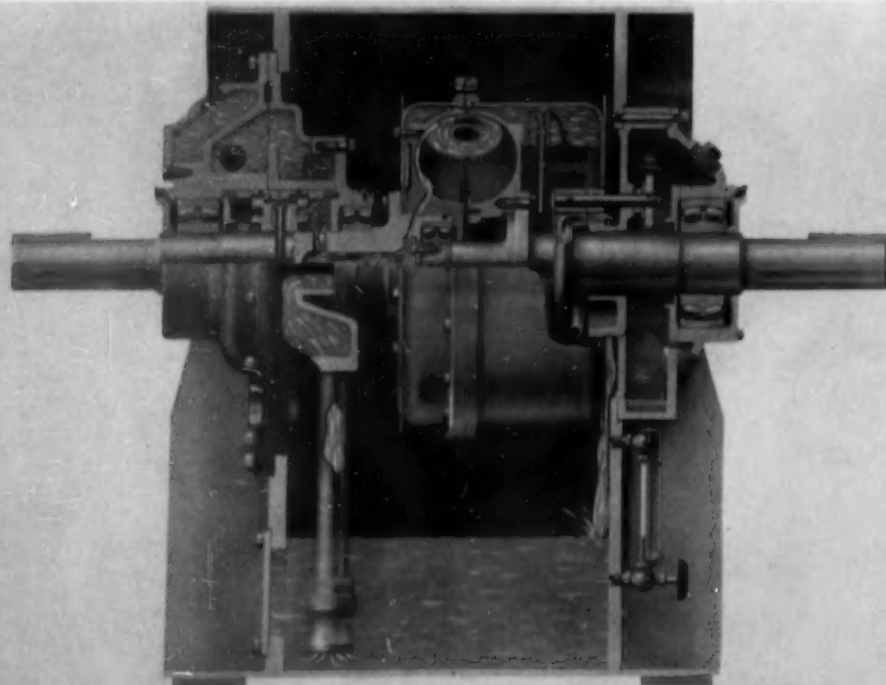
Advantages are also offered with regard to compounding. The Gyrol drive can be quickly and easily declutched. There is no mechanical connection between the input and output shafts. Withdrawal of oil by extending the scoop tube removes the effective power transmission medium between the input and output. Where Gyrols are used for compounding, any engine may be shut down or idled while the other engines carry the load. As operating conditions change, requiring additional horsepower, the idle engine can be immediately put into service, picking up its share of the load without any re-connecting operations and without shutdown of the engines. The use of Gyrols in compounding diesel engines eliminates the possibility of one engine assuming an overload. The load to each engine can be regulated through the respective fluid drive as required.



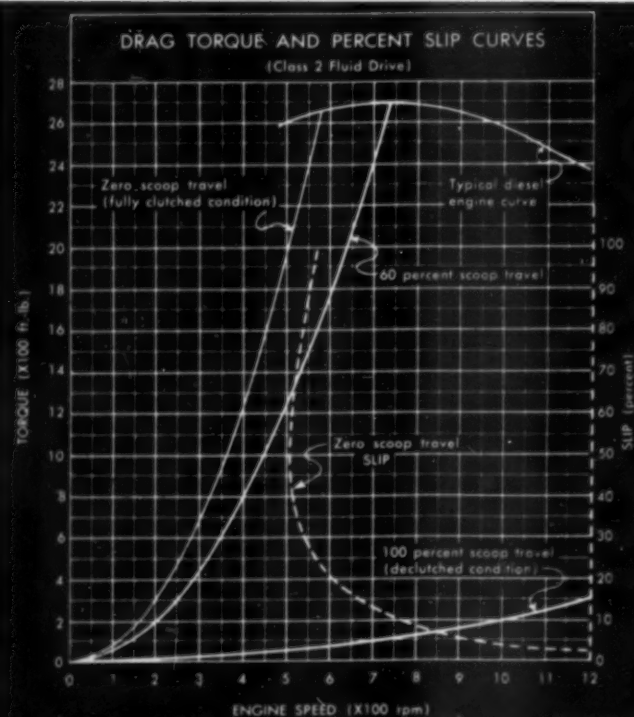
The Type VS, Class 2F Gyrol fluid drive is available for applications involving power requirements from 280 to 820 hp at operating speeds up to 1200 rpm. Its special diesel application design includes an all-welded heavy gauge steel outer casing which serves as an enclosure for the rotors, bearings, oil circulating pump and speed regulating tube. It is built to fit standard 18-inch channel skids. The rotating elements in the new heavy-duty

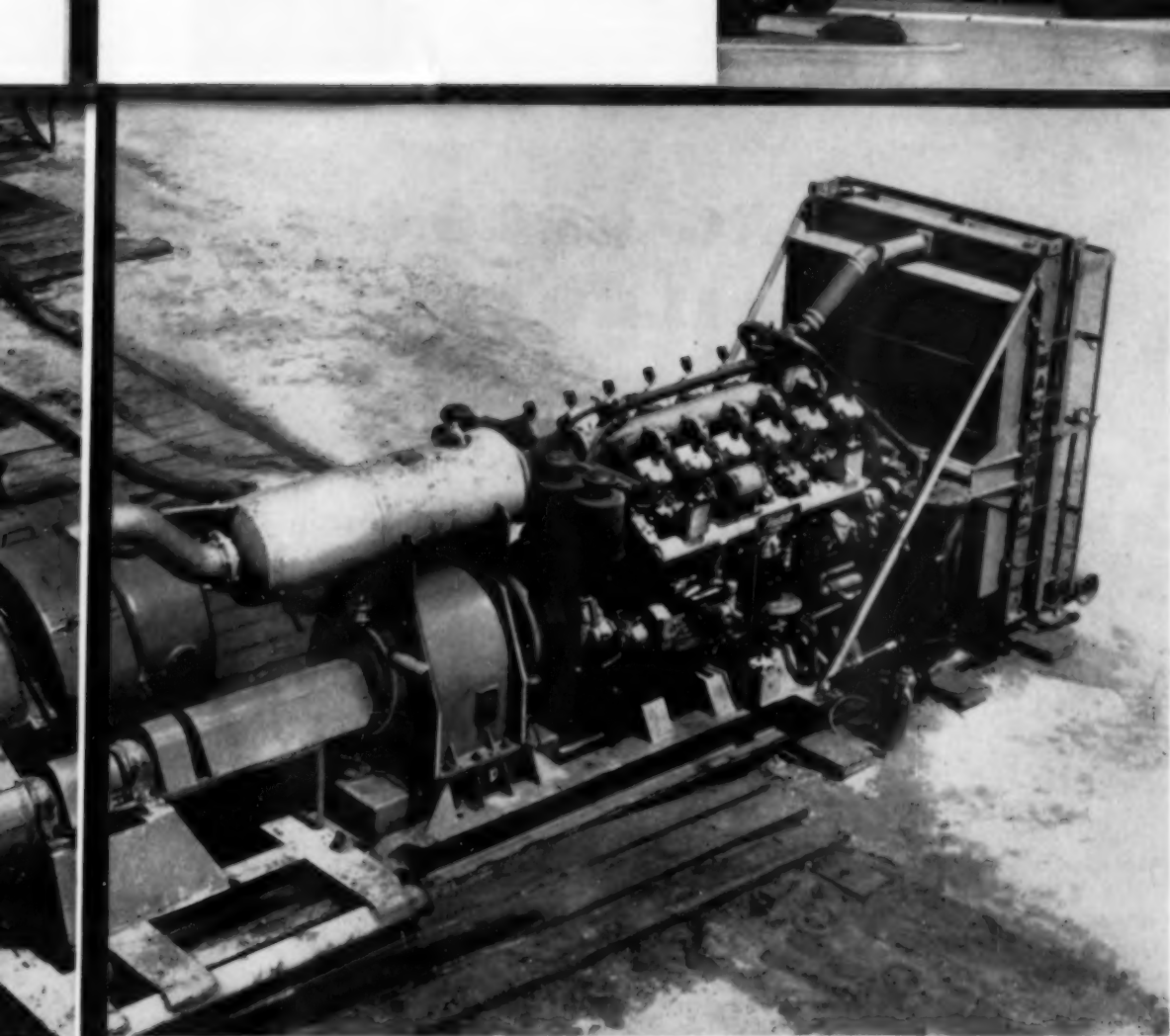
Cutaway of an adjustable speed fluid drive. Input shaft, impeller and casing rotate together at engine speed. Output shaft and runner rotate together at output speed. There is no mechanical connection between input and output members. Power is smoothly transmitted from the impeller to the runner by a vortex of oil. Output speed is adjusted by regulating the amount of oil in this working vortex by means of scoop tube position. Scoop tube mechanism is actuated by a push-pull control rod.

46



Performance curves for a typical Gyrol fluid drive. Also shown is torque/speed curve for typical diesel engine. Note that fluid drive torque can be adjusted to peak at point of optimum engine rpm.





Slush pump being driven by a Waukesha V 12-cylinder diesel engine through a Gyrol fluid drive.

unit are milled out of solid forged steel for added strength and long life. A unique design feature that contributes to ease of inspection in the field is the end bell type housing construction. Similar in basic design to an electric motor housing closure, disassembly of the end bell housing cover permits removal of the rotating assembly and casings as a unit for quick and complete accessibility when inspection of the unit is desired.

Input and output shafts are supported on four heavy-duty spherical roller bearings, one of which is a pilot bearing located between impeller and runner. All bearings are lubricated by cooled circulating oil. The impeller and runner are enclosed in steel inner and outer rotating casings. Shaft seals are of the labyrinth type that keep exterior surfaces dry during high speed operations. A turbine type oil circulating pump is mounted directly on the input shaft. This pump delivers a constant volume of oil for the working circuit, for lubrication and for cooling. The scoop tube, mounted between the inner and outer rotor casings, is positioned by a sliding type control mechanism which provides stepless, adjustable speed and torque control. The drive comes equipped with a speed control rod and is readily adapted to control mechanisms familiar to diesel operators and oil field workers.

Oil rig operation has perhaps as wide a range of power transmission requirements as can be found in industry. The slush pump has a high power requirement when working in a deep hole against high pressures; when pipe is being pulled, fast hard-clutch action is required; fishing operations want a soft, easy clutch and slow rotation; the cathead requires fast response with intermittent rotary mo-

tion. Adjustable speed Gyrol fluid drive possesses the control flexibility to meet this wide variety of requirements. In addition to stepless speed and torque control, it performs the function of a liquid shear pin in protecting the engine and the rig components from sudden shock loads and in isolating torsional vibration. The smooth application of power plus the cushioning action bring about reduced wear and less rig down time.

The Gyrol's ability to extend output speed to a very low rpm without danger of stalling the engine is of particular value for (1) fishing operations which require slow table rotation; (2) slush pump operation at reduced speeds to match the requirements of increased pressure and depth conditions; and (3) coring with slow table speeds in soft formations. For conditions such as testing casings and clearing plugged bits, the Gyrol fluid drive unit permits pressure to be held on the slush pump with the output shaft stalled without harmful results. Slush pumps consume the major share of power on the rig. Power requirements will vary during operation depending upon drilling depth and pressure. Power transmission through the Gyrol drive from engine to pump is smooth and efficient. As the engine approaches full load with increased pressure and depth, the adjustable speed fluid drive can slow the pump while the engine continues to operate in its most efficient range. Mud pressure can be held with the output shaft stalled or slightly turning.

Use of Gyrol fluid drives with diesel engines is not limited to oil rigs. Flow control in pumping fluids of varying densities is a good example of a common problem facing diesel engine users. The ad-

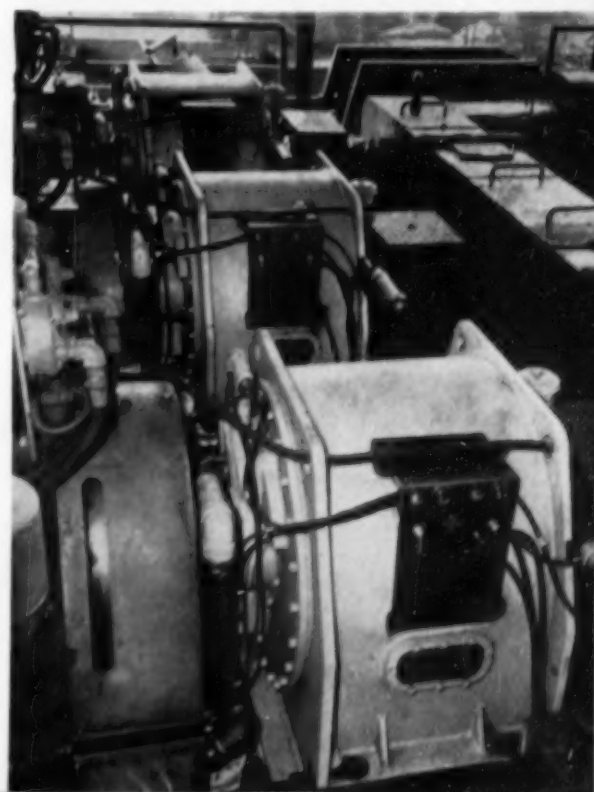
justable speed advantage of a high-horsepowered Gyrol unit solves this problem by having the fluid drive installed in such a way as to automatically control pump speed, providing the desired flow capacity relative to density and volume of product batches in the pipeline.

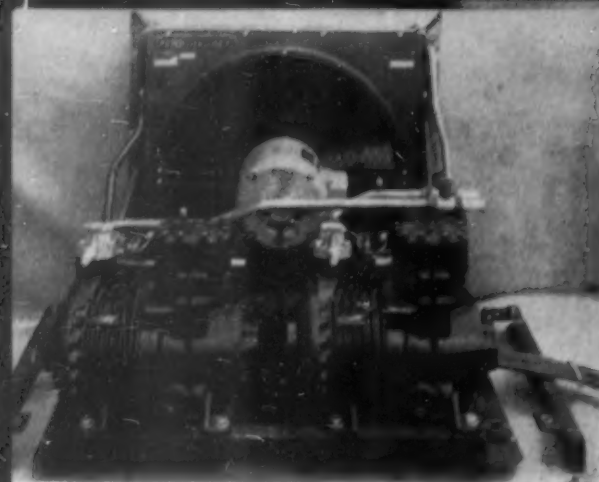
Centrifugal and positive displacement pumps are used extensively in the modern refinery. The vast network of these pumps covers a wide range from small to large horsepower requirements. Gyrol drives are available in a broad horsepower range to meet these needs. Since throttling valves are eliminated where adjustable speed fluid drives are used, the danger of sticking valves resulting from the gummy conditions frequently encountered is also eliminated. This cuts maintenance costs and minimizes shutdown time.

When large pipeline pumping stations require alternating current for station auxiliaries, it is sometimes desirable to drive a generator at constant speed from the main station engines. This poses a problem in view of the fact that these same engines are used for adjusting product flow through the pipelines at various speeds. Constant speed generator drive is needed for good cycle and voltage regulation. Gyrol drives can help here also. By interposing it between the engine take-off and the generator, the fluid drive is automatically adjusted to transmit constant speed, although the engine may fluctuate over a wide range. Even under sudden load demands on the generator, close cycle control is well maintained.

Use of adjustable speed fluid drives with diesel engines is not limited only to the examples discussed. In installations where speed control, shock load protection, vibration isolation or torque limitations are requirements, Gyrol units can be advantageously applied, and particularly well with the larger slow speed engines.

Three-engine rig compounded on the output side of three Gyrol drives.



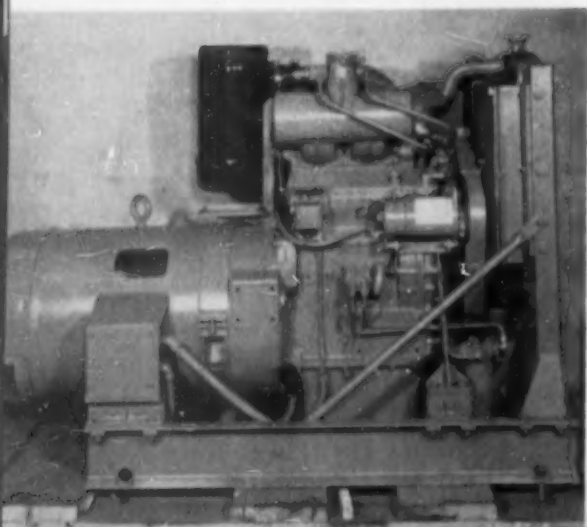


This condensing unit assembly consists of two Frigidaire 5 hp sealed reciprocating direct-connected compressors, a Freon receiver, and a condenser that is air-cooled by a six-bladed fan driven by a 1 hp motor. The condenser is sectionalized to provide two independent condenser coils within a common frame. The refrigerant receiver is also sectionalized although it is contained within one unit. The two compressors, sectionalized condenser, and sectionalized receiver permits two complete refrigeration systems independent of each other within a single assembly.



Carrier engineers Churchill and Kulinski checking over one of the new packages from their factory at Syracuse at the PFE shops at Roseville, Calif.

This diesel engine alternator unit consists of a General Motors 2 cylinder, 2 cycle, constant speed diesel engine. It is rated 34 hp at 1200 rpm with an inherently regulated alternator (20 kw, 220 volt, 3 phase, 60 cycles) directly coupled to the engine drive shaft.



ROLLING ZEROS FOR RAILROADS

**Pacific Fruit Express Invests Another \$4,000,000
In Diesellized Mechanically Cooled Refrigerator
Cars To Meet Farmer-Consumer Demand.**

By F. HAL HIGGINS

THE diesel engine has met one of the toughest of many hard problems put up to its since it got into production scarcely a half century ago. I refer to the powering of the mechanical refrigerator cars that are fast rolling into the food transportation business to add hundreds of millions in income to farmers growing fresh fruits and vegetables while adding to the daily diet of millions of families throughout the U.S. The recent announcement of the Southern Pacific and Union Pacific railroads' subsidiary, Pacific Fruit Express, that another 200 mechanically refrigerated over-size cars and 1,800 standard refrigerator cars are being built, reports an investment of over \$26,000,000. Said K. V. Plummer, vice-president and general manager of Pacific Fruit Express: "The cars are to be built at Roseville, Los Angeles and Colton shops of Pacific Fruit Express. First of the new cars should be ready by December, 1956, with completion of the program by July of next year." Mr. Plummer added, "175 of the present ice-bunkers are to be converted to mechanical refrigeration to bring them up to the demands of modern frozen food transportation. This is the largest order of PFE cars in the past five years. The 200 new mechanically refrigerated cars added to those already built raises the company's total to 712. The additional standard cars will lift the refrigerator fleet to 38,000."

Mr. Plummer mentioned in his statement that his company was providing more modern equipment for protection of the large volume of perishable shipments from Western and Southwestern areas to Eastern markets. That is putting it mildly, as the following item from the USDA January 25, 1956, *The Fruit Situation*, proves: "Record-large pack of frozen strawberries in 1955. The 1955 commercial crop of strawberries was approximately 13 million crates, one-tenth larger than the 1954 crop; 58% was processed, mostly by freezing. Nearly 89% of the volume processed was grown in California, Oregon and Washington. Output of frozen concentrate for lemonade through December 24th of the 1955-56 season was about 269,000 gallons, more than four times the output in the same period of 1954-55. Total production of frozen fruits and fruit juices in 1955 is tentatively estimated at approximately 1.4 billion pounds, about 9% larger than

1954. Output of R.S.P. cherries was 28% above 1954. The pack of peaches was 29% larger than in 1954. Most of the increase was in California, where the 1955 peach crop was up 10%. Total production of frozen deciduous fruits was about 15% larger than the 1954 pack of 523 million pounds."

That gives the reader an idea of the marvelous transportation marketing service built up to serve California agriculture and the nation's consumers of foods over the past 80 years. It's only 74 years since the first fruit train was sent east from California to start the idea of fast service for the state's fruits. The railroad system already built and equipped to serve the public's demands for an abundance of fresh fruits and vegetables as well as the old standbys, meat and potatoes, with both equipment and know-how is in a key position in this expanding post-war era.

Engineer Edward Mohr of PFE pointed out several little changes that had been made in the diesel installation in PFE cars since the first such cars were constructed. The close cooperation of engineers from PFE, diesel engine and refrigerator equipment companies has worked out answers to little problems that developed over the past years and the millions of miles service their installations have operated. Nor are any of those concerned sitting back resting on their successes, great as they are in the practical achievement that touches three most demanding and exacting sectors of the public—farmer, transportation company and consumer. Any of them can and will change to products and methods that can still better serve them. A visit to the San Francisco offices of PFE brought your reporter in contact with Edward Mohr, engineer of car construction, who, under Mr. G. P. Torburn, is in personal charge of the design of the new mechanical refrigeration cars to be constructed at Roseville. Mr. Mohr reminded the writer that the type of equipment has not yet been selected.

To get the Frigidaire story, I moved across the bay to finally locate Mr. Killen, who had been out in the territory so much it has taken a month before he could be caught at his office. "Correct temperature in these cars of perishable foods is not

enough," say Frigidaire engineers. "Humidity and air movement must be considered for each commodity loaded. Working with the railroads and associated companies, Frigidaire developed cooling equipment to meet operating needs, shippers' desires and food preservation conditions. This refrigeration equipment was designed to meet the severe operating and wide atmospheric conditions encountered in railroad service. Adequate capacity is controlled to maintain the right temperature."

"More than 28,000 cars of frozen food have been satisfactorily refrigerated over more than 42,000,000 loaded car miles," Mr. Killen stated as proof of the place the dieselized system of his factory has won in this most exacting test of engineering and equipment. "Ruggedness has been a prime consideration in design and has been a big factor in establishing satisfactory performance in this service."

The primary source of power in the five major packages for the typical refrigerated railway car is a continually running diesel engine alternator combination. This diesel supplies electrical power for driving the refrigeration equipment. It is extremely rugged. Proof is found in over 14,000 hours of operation on a refrigerator car with no apparent evidence of overhaul need. Four main packages are in the Frigidaire refrigeration equipment that goes into these cars. Each completely fabricated unit delivered to the car builder has all five of these packages: 1. A condensing unit assembly. 2. A cooling-defrosting-heating assembly. 3. The blower which provides air circulation through the car. 4. The cooling-defrosting assembly is supplied with auxiliary panel containing metering devices for the refrigerant. 5. Diesel engine-alternator assembly.

The engine-alternator and the condensing unit are shock mounted on the floor in a louvered machine compartment at one end of the car. Cooling-defrosting assembly, as well as blower and motor assembly, are mounted in the bulkhead between the machine compartment and the cargo space. The refrigerant panel is mounted to the same bulkhead on the machine compartment side. Condensing unit, refrigerant panel and the cooling-heating assembly are quickly inter-connected by flexible refrigerant lines when the other units have been bolted in place. The control panel is then installed in the machine compartment. Down under the floor, fuel tanks and cranking battery are installed by refrigerator car builders.

"Carrier Corporation's initial venture alone was 10 units with the Santa Fe railroad in 1952," said Henry W. Kurlinski, Development Engineer Transportation Equipment, Allied Products Division, Carrier Corporation, who was contacted at Pacific Fruit Express shop office, Roseville, California. "Today we have 100,000 hours operating time put on those first 10 units. All are operating successfully. Last year we installed 50 heavy capacity units here in Pacific Fruit Express cars. We use the GM diesel engine as the power plant. We use coils that are circuited so that when one compressor is operating alone an increased capacity of approximately 15% is realized due to utilization of the full fin surface area of the coils. These were the first units on Pacific Fruit Express cars where automatic de-

frosting by use of a differential pressure switch was accomplished." (This is a Carrier patent.)

"We use a 2-step cooling thermostat. This feature allows the operation of a single compressor when load conditions are moderate, and results in greater compressor life. Another feature of our 2-step cooling system is that a load is imposed on the diesel set during its period of operation. It is quite rare that a diesel set would run on very light loads for extended periods of time. Our all-purpose unit powers heating as well as cooling. It will operate satisfactorily from -30°F. to 120°F. ambient temperature. Another feature is all refrigerant controls are located in the machine compartment and are readily accessible for service. This means that mechanics need not open up any insulated plugs to get at any refrigerant controls. The Carrier refrigerant system is made up of two independent units on a common base. According to Pacific Fruit Express, it is possible to pull down the car with one unit alone and carry a load safely across the country. This is in reference to the first 50 Carrier units installed in PFE cars."

"Basically, these new Carrier units are the same as the original installations we made two years ago for PFE, except that the 4-cylinder 5 hp hermetic compressors are used in place of the open compressors. This permits a low center of gravity and the elimination of four shock mounts. They are easier installed in the cars, too. Defrosting is the same for both old and new systems. During the defrosting operation, the frost would drip off the coils onto the heated drain pan and then go through the hole in the floor into a heated drain trap. That was applicable to those first 50 installations. On the new Carriers the drain trap heater is eliminated. A combination drain pan and drain trap heater was built into the pan. This eliminated the necessity for providing an additional heater which was located under the floor of the car."

"We have redesigned the electric control panel, using Westinghouse equipment tested to withstand severe coupling shocks for the new units. The panel has heavy duty controls, crack-proof fuse blocks, all mounted on an extra-heavy metal panel and a dust-tight cabinet. We have removed approximately 600 pounds of weight in the new Carrier design."

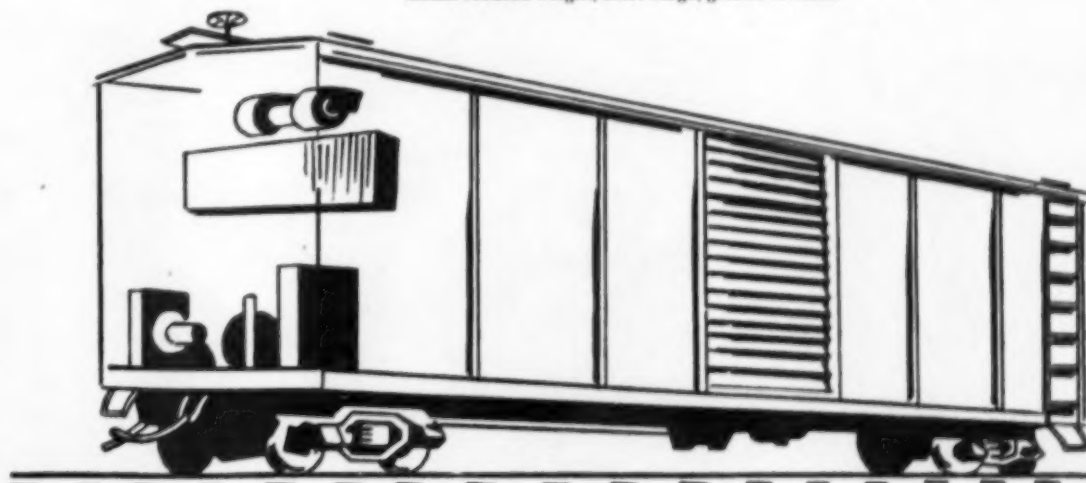


Here is a car being loaded with frozen strawberries from one of the farmer co-op plants in California, which has become No. 1 strawberry state.



GM diesel with Carrier cooling-heating hook-up at Roseville ready to lift out after months of service. This is one of the original Carrier-GM installations.

Notice the small amount of space the Frigidaire Refrigerating equipment requires; this means reduced weight, more cargo, greater revenue.



CARGO CARRIER "INAGUA ROVER"

By ED DENNIS

A New Type of Multi-Purpose Ship for Inter-Island Freightling in the West Indies.

BUILT for island-hopping in the West Indies, the *Inagua Rover* is a vessel so unusually built that it has no designation in shipbuilding terminology. It is a combination landing craft, freighter and liquid carrier, designed and constructed by Dade Drydock Corp. of Miami, Florida for the West India Shipping Co. The *Inagua Rover* is 140 ft overall, 34 ft beam plus 9 ft 3 in. from keel to main deck. It displaces 220 tons light and 645 tons when loaded, which gives her a pay load of 425 long tons. The draft of 7 ft enables her to go into almost all harbors in the Caribbean area.

Several of the unusual design features are the split forecastle and the deckhouse aft, the 75 ton capacity folding bow ramp, plus the unusual piping arrangement which allows the craft to double as a tanker with the same pay load. Although the 140 ft craft is primarily a deck cargo carrier, she was also designed to carry 130,000 gallons of liquid cargo. Accordingly 4 in. main cargo piping was installed and 1½ in. stripping lines were also fur-

nished to 10 cargo tanks leaving 6 side tanks for ballast purposes as needed.

She is powered by two model D375 Caterpillar diesel engines rated 300 hp each at 1000 rpm; the diesels drive a 3:1 Snow Nabstedt reduction gear. The five bladed Ferguson propellers are 56 in. diameter with a 38 in. pitch giving the *Inagua Rover* a speed of better than 11 knots with a cruising range of almost 5000 miles, sufficient to cover most of the Caribbean ports. Construction is of ¾ in. plate, transverse framing on 2 ft centers with a centerline bulkhead and twin longitudinal bulkheads. This divides the midsection of the vessel

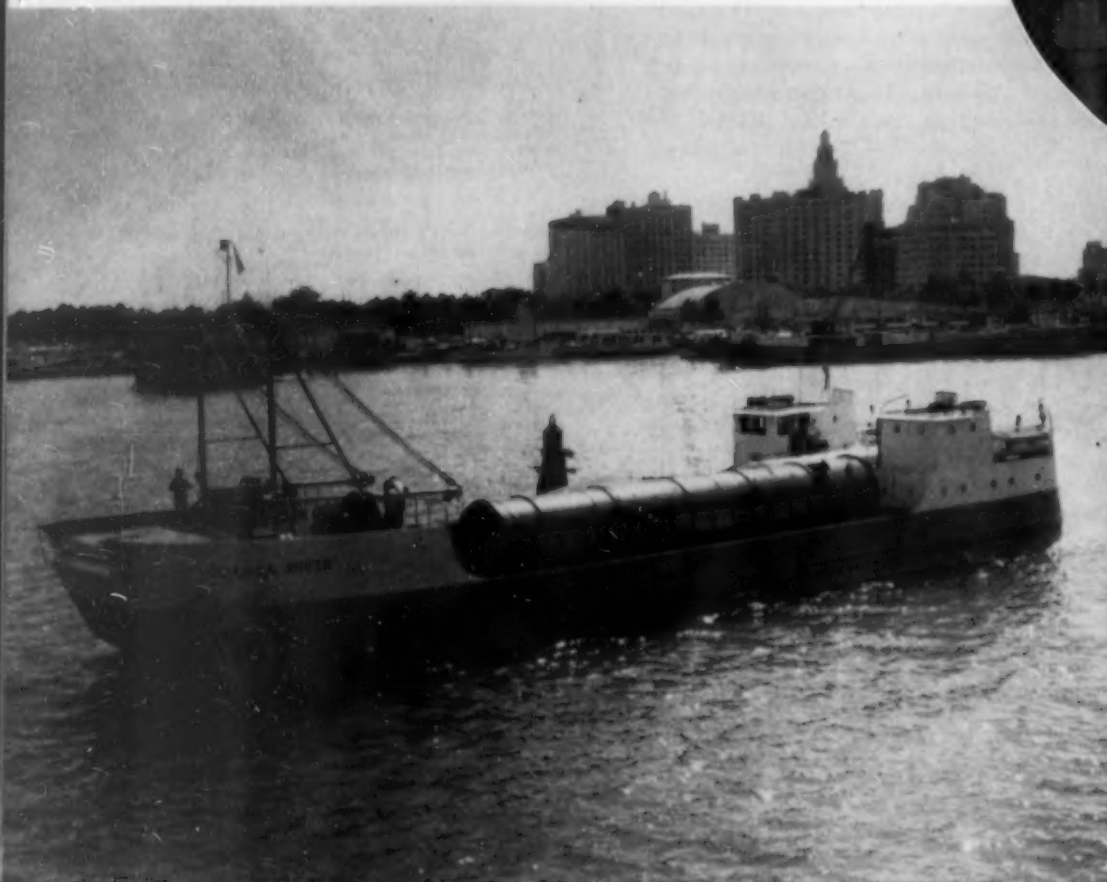
into five groups of tanks four abreast. The first three groups are cargo tanks inboard, the wing tanks are ballast. The fourth group is all cargo and aftermost tanks carry fuel oil for the diesels.

Two model D311 Caterpillar diesel generating sets having a rating of 19 kva at 1200 rpm, supply all the electrical power needed on the vessel. Schwitzer air cranking motors are used for starting these aux-

➡ The Schwitzer air cranking motor model A15R10J which is used on the Caterpillar diesel auxiliary power units.

➡ Bow view, show the bow ramp which was designed to hold a 75 ton crane. It is 14 ft wide, 20 ft long and weighs 6 tons.

➡ Lower right corner—One of the Ross heat exchangers used on the main propulsion diesels.



iliary units. The engine room also contains a Fairbanks-Morse fresh water system, Quincy air compressor and Ross heat exchangers.

The *Inagua Rover* is a prototype, according to Alex Balfe, president of Dade Drydock, and if proven successful other similar craft will be constructed. It is classed by Bureau Veritas as either a deck cargo carrier or a bulk liquid carrier.

Left to right: Ray Pearson, NA, ME, Chief Engineer of Dade Drydock Co., Miami; Gordon Swenson, Vice President and Operations Manager of West India Shipping Co.; Henry Read, President of West India Shipping Co.; Leon Dollet, Port Engineer of West India Shipping Co.

Here the *Inagua Rover* is shown on her first trip to the West Indies. This is the latest member of the *Inagua* fleet of the West India Shipping Co.



91



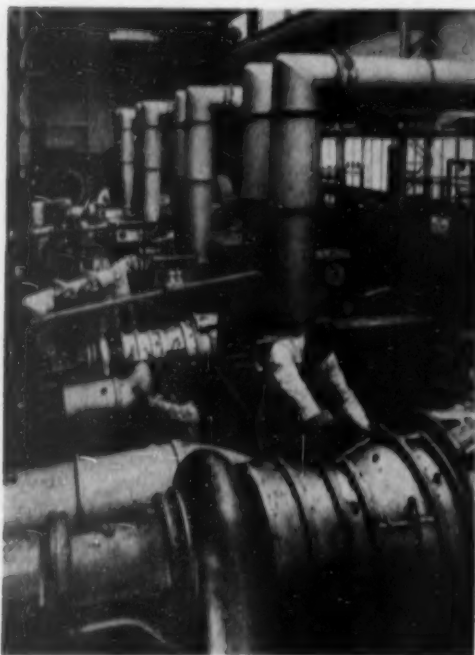


WHAT'S GOING ON IN ENGLAND

CONDUCTED BY BERNARD W. LANSDOWNE

Bernard W. Lansdowne is an associate member of the Institution of Mechanical Engineers and is widely known among British and European diesel manufacturers as editor of our English contemporary "Gas & Oil Power." His early workshop training was spread over seven years with A.E.C., Ltd., Southall, following which he served some five years with that company's sales engineering department. He entered technical journalism as assistant editor of "Gas & Oil Power" in 1950 and was appointed editor in 1952.

It is just over six years since Ruston & Hornby, Ltd., of Lincoln, first introduced their prototype industrial gas turbine, a 750 kw open-cycle unit that can still be seen running at the company's works. Since that time, Ruston has sold many of these medium-sized turbines which now have a nominal rating of 1,500 bhp. This expanding demand for the turbine has resulted in extensive re-organization of the production and test facilities at the Lincoln factory.



Five of six turbines which the new test building can house, are seen here.

I recently had the chance of seeing something of the re-organization and of inspecting Ruston's new turbine test house with its associated propane gas fuel plant. The propane plant is probably unique and, indeed, there are few existing gas turbine test houses laid out on the scale of the new Ruston plant. The necessity for installing a propane gas fuel plant has arisen from the vast developments taking place in various parts of the world of natural gas resources. Many of the orders received by Ruston are for turbines to operate on these fuels and the propane plant will provide the fuel mixture necessary for factory tests on the turbines.

Prior to the completion of the new gas plant, the testing of gas-fired units had to be carried out using bottled methane, which is obviously an expensive and impracticable method. To overcome this difficulty, it was decided to build a plant in which suitable gas could be stored as a liquid in pressure vessels, to be drawn off, diluted with air and passed to the turbine as required, via a control panel. A gas was required that could be supplied in bulk and easily transferred to storage vessels and propane was selected as being the most suitable for this purpose. The plant will supply a gas mixture which can be delivered to the turbine test room with a heating value adjustable between 600 to 1,200 btu's per cu. ft, the fuel being Shell propane brought to the works by road tankers with transfer pumps.

The new turbine test building itself, while of moderate size, can handle no less than six gas turbines simultaneously and test them on various types of fuel. The site, moreover, allows for further expansion in two directions. The building is of steel-frame construction, 132 ft long by 52 ft wide by 38 ft 9 in. high. The width includes an 11 ft annex which provides the main shop gangway and supports the air filter gallery at ceiling level. This gallery runs the full length of the building and air is drawn in through fixed aluminum louvers. At one end of the building, a fixed high-level gallery provides a test bed for testing those turbines which will operate the heat exchangers. The building is constructed of corrugated aluminum sheet and a large area of the interior is lined with Burgess acoustic tiles to provide combined thermal and acoustic insulation. The test shop has been largely designed around the standard Ruston TA-type turbine, but provision has been made for two test

beds on which very much larger units can be tested if this is required for testing purposes.

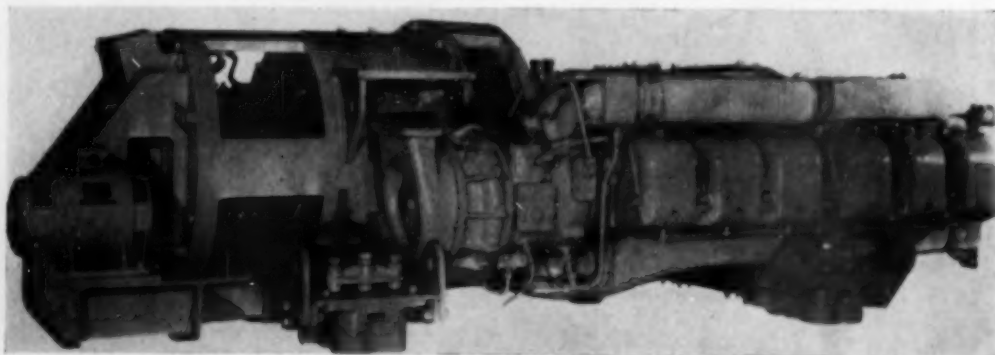
All services are placed below ground level with service trenches carrying oil fuel lines, compressed air, welding, power and test cables, liquid propane gas fuel, river and town water. Branches carry the service from the main ducts to the individual test beds. Inlet air for the turbines is taken from the outside atmosphere into the filter gallery. Each turbine bed has its own individual filtering unit which can be moved into position to suit the air inlet connection of the compressor.

Paxman's Latest Horizontal Diesel

Davey, Paxman & Co., Ltd., of Colchester, have extended their range of 7 in. bore by 7 3/4 in. stroke railcar horizontal diesels so that it now includes four-cylinder and six-cylinder models either normally-aspirated or turbocharged. The horizontal range is known as the ZH series and is intended to meet power requirements beginning at a point where the normal road transport type engine stops. The latest addition to the ZH range is a six-cylinder turbocharged design, details of the complete ZH series being as follows:

PAXMAN HORIZONTAL DIESEL ENGINES			
Type	B.H.P.	R.P.M.	Dry wt. lb.
4 ZH	200	1,500	3,750
4 ZHX	300	1,500	4,400
6 ZH	300	1,500	5,050
6 ZHX	450	1,500	5,850

Paxman's new horizontal turbocharged diesel developing 450 bhp at 1500 rpm.



Shunters With Rolls-Royce Diesels

The first rail traction application of diesel engines built by Rolls-Royce Ltd., marks another step in that company's engineering history. Rolls-Royce has been building high-speed diesel engines for some years and they have been used in many marine, industrial and automotive installations. The design is obviously suitable for certain rail traction uses and the first of these was demonstrated recently by the Yorkshire Engine Co., Ltd., of Sheffield, when they introduced a new range of diesel-electric shunters. The Yorkshire Engine Co. has been building steam locomotives for more than 90 years and since 1948, in collaboration with British Thomson-Houston Co., Ltd., and using Paxman diesel engines, they have been making diesel units.

The new Rolls-Royce-engined shunters are called the Janus and are available in 200 hp 400 hp form. Both locomotives are fitted with British Thomson-Houston transmission units and are complementary to each other in that the equipment of the 400 hp model merely duplicates that of the less powerful locomotive, i.e., it has two 200 hp Rolls-Royce diesel engines instead of one. The adoption of the Rolls-Royce engine, which is basically an automotive unit, has facilitated the provision of an engine-generator set considerably smaller than is typical in locomotives of this power. Important implications arising from this are that it reduces first cost and maintenance, and enables a smaller bonnet to be fitted, thus improving visibility from the locomotive cab. Excellent visibility in all directions is, indeed, a special feature of the Janus, this being an important safety factor for service in crowded industrial rail sidings.

The following are the principal particulars of the 400 hp Janus, which is built for any gauge from meter to 5 ft 6 in.:

Weight	48 tons
Tractive effort at starting	30,000 lb.
Speed at continuous rating	8 mph
Tractive effort at continuous rating	13,100 lb.
Maximum permissible speed	23 mph
Minimum negotiable curve	123 ft radius

In general design the Janus diesel-electric shunter follows conventional rigid frame practice composed mainly of steel sections and, as most of the weight is in the under frame, its strength is claimed to be superior to that of a steam shunter and to most other types of diesel locomotive. The engine-generator sets are mounted on resilient supports and there is no direct connection other than electrical, between them and their traction motors which hang on the outside pairs of wheels. The covers enclosing the power units consist of two sections, each of which, being comparatively small and light, are easily removable for maintenance purposes. The centrally-placed driving cab has doors opening on to diagonally-opposite platforms accessible from the front and rear buffer platforms. The control desk is in the center of the cab to allow the driver considerable freedom of movement without loss of visibility. Control is effected by means of a throttle directly connected to the two engine governors and which also operates the main contactors. All the controls are duplicated at either end of the desk.

It is impossible to overload the diesel engines because the generator characteristics adjust the speed of the locomotive to suit the tractive effort required. This system of control provides a continuous and smooth variation of locomotive speed and tractive effort between standstill and full power, simply by varying the engine speed. Unlike diesel locomotives fitted with other types of transmission, the fullest utilization of the available power is achieved. When limited power only is required for light duties, one engine-generator unit can be completely shut down.

Testing A Pipe Line



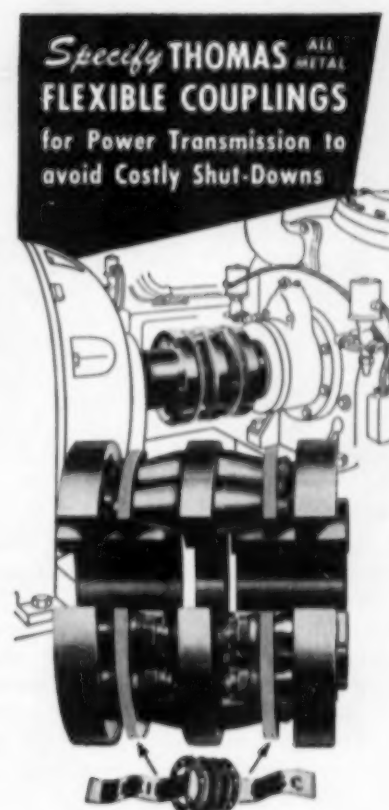
Three Caterpillar diesels testing pipeline.

A 400-mile section of the American Louisiana Pipe Line is now being tested with compressed air and natural gas. This 30-in. line extends from Willow Run, Michigan, to Cameron, Louisiana. When completed, American Louisiana Pipe Line Company's \$130,000,000 project will represent one of the longest thirty-inch lines in existence. It will serve customers in the Michigan, Iowa, Missouri and Wisconsin areas.

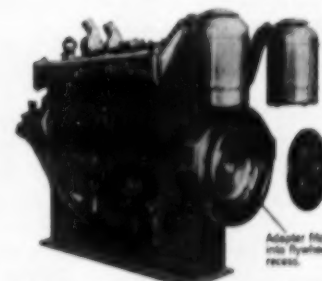
Ten Caterpillar diesel engines driving Gardner-Denver Compressors comprise all the testing units. All of these will compress air except one which will serve as a gas unit and will test the southern end of the line. Each testing package is composed of one high-stage and two low-stage compressor units connected in series. The high-stage is mounted on one Martin Trailer, while the two low-stage units are mounted on another. Each trailer has a 560-gallon fuel tank for its respective engine. The two engines for the low-stage compressors draw their fuel from the same tank. It will supply the low-stage engines for about 24 hours and the high-stage for about 48 hours.

The low-stage Gardner-Denver Compressors are Model WBK six-cylinder, two-stage, water-cooled units rated at 500 cfm. They are powered through a V-belt drive by a Caterpillar D337 diesel engine developing 165 hp at 1760 rpm. The high-stage unit is a Gardner-Denver Model RXE capable of pressures from 150 to 950 psi. These units operate at 300 rpm and are rated at 1,000 cfm. They are driven from a V-belt drive through an intermediate shaft and chain drive by a Cat D337, producing 175 hp at 1600 rpm.

Compressed air testing offers the pipe line company two distinct advantages. It is safe and fast because minimum waiting time is consumed, and cleaning and testing are practically one operation.

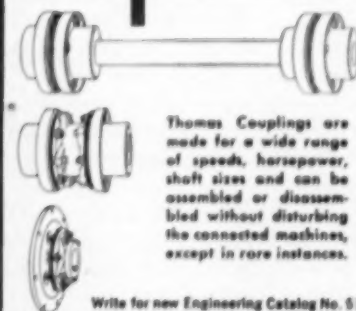


Patented Flexible Disc Rings of special steel transmit the power and provide for parallel and angular misalignment as well as free end float.



Typical Flywheel Adapter Application

DISTINCTIVE ADVANTAGES	
FACT	EXPLANATION
NO MAINTENANCE	Requires No Attention. Visual Inspection While Operating.
NO LUBRICATION	No Wearing Parts. Freedom from Shut-downs.
NO BACKLASH	No Loose Parts. All Parts Solidly Bolted.
CAN NOT "CREATE" THRUST	Free End Float under Load and Misalignment. No Rubbing Action to cause Axial Movement.
PERMANENT TORSIONAL CHARACTERISTICS	Drives Like a Solid Coupling. Elastic Constant Does Not Change. Original Balance is Maintained.



Thomas Couplings are made for a wide range of speeds, horsepower, shaft sizes and can be assembled or disassembled without disturbing the connected machines, except in rare instances.

Write for new Engineering Catalog No. 51A

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WARREN, PENNSYLVANIA, U.S.A.



EASTERN DIESEL OBSERVATIONS

A COMMENTARY BY ARNOLD B. NEWELL

Arnold B. Newell, a third generation American, was born near Seattle, Washington of pioneer stock. He obtained his engineer's license at 21. Sailed as chief engineer on one of the first ocean-going motorships built in the U.S.A. In 1924 he joined New York Shipbuilding Company in diesel advisory capacity, tested and took to sea New York-Werkspeer diesels, supervised operation of shipyard owned vessels, then in 1927 joined Ingersoll-Rand as diesel field engineer. Became associated with "Motorship" in 1929. Subsequently became managing editor of "Motorship" and "Diesel Power," then vice-president and general manager.

THE powering of small privately owned in-shore fishing boats often presented an economic problem of almost insurmountable magnitude. The owners lacked the money with which to buy diesels and had to settle for old automobile engines rigged up as propulsion units. The rate of fuel consumption was high, the life of the engine was short and it took quite a lot of money to change engines even though many of them were adept at doing their own re-engining job. Some were afraid to install diesels because they knew their own weaknesses. They neglected their engines, ruined them and thought they could not afford the risk of neglecting a diesel costing several times the price of a Buick motor picked up from a junk yard.

Now, fishermen are richer. This may be due to influences such as current solicitude for the well being of our pets who turn up their canine and feline noses at scraps from the table and want their food in cans purchased at supermarkets, no less. This and other factors placed a premium on trash fish and, as a matter of fact prices have advanced to a point where lobstermen can not afford to buy fish to bait their lobster pots. All of this adds up to the fact that fishermen can now afford new diesels and covering the waterfront is a profitable occupation for the salesman who must be content with something less than a 100-engine order for mobile equipment.

Everyone knows that it is easy to find lots of fishermen on the Pacific Coast and it is becoming more difficult to find deep sea fishermen in New England, but what is not too generally known is the fact that there are literally thousands of small fishing craft working out of harbors along the Atlantic Coast bringing in everything from mackerel to skimmer clams and now they have the money to buy diesels, while understanding that they can no longer afford to use any other form of power. In fact the power is now predominantly diesel. Somehow the fishing industry in the East has never been as well publicized as it has been on the Pacific Coast, but it is more than likely that the sum total of boats working out of places such as Cape May, Montauk Point and Noank could make a good showing compared to the fleets in the West.

Railroad Tugs

One of the most interesting studies in contem-

porary marine design is found in the railroad tugs operating in New York Harbor. They are powerful boats compared to the steamers they have replaced. The diesel tugs usually replace steamers at a rate of about three for five. That three boats do the work of five is not, however, the only incentive to dieselize. Ability of the diesel boats to keep to schedule enables trains to depart on time without regard to wind and tide which at one time caused delay of annoying nature for car floats that must make train connections. The time saved is not all due to higher power.

In one instance we find dieselized railroad tugs of around 1000 hp electric drive on the shaft doing adequate jobs while new tugs for other services go up to some 1380 hp and now a group of even more powerful boats in the 1800 hp range will be used in the swift-tide Hell Gate section. Perhaps more than in any other class of work, wishes of the captains are granted by the owners, especially in the matter of electric propulsion. Almost to a man, the skippers are agreed that power is important but perfect maneuverability is even more important. Another extraordinary situation is the ability of the diesel, or diesel-electric tug in railroad service to pay for itself in savings over steam tug operation in three years or less. Here again we encounter more than fuel economy. Even though the diesel tug has the same number in the crew, there are now two less crews for every five steamers displaced, two less boats to drydock and paint, and all the way down the line it is only three where it was five boats to keep going.

The overall economy that enables a railroad to amortize the entire cost of dieselizing its towing fleet in three years would seem to eliminate steam on the harbor, but that is not true. There is diesel business to be had because railroads buy on credit and their borrowing power is limited to the extent that they must keep on losing money with obsolete equipment whether they like it or not. There is one consolation in this situation. The market for marine diesels is still there to be had, and sales will come sooner or later.

Heat Exchangers

Of all the attachments used on and in connection with diesel engines, the heat exchanger stands head and shoulders above much of the supplementary

equipment in point of importance. Its general acceptance suffered unwarranted reverses at first because engine makers were opposed to the use of gadgets. Sea water on ships and nearly any kind of raw water on land was considered good enough.

Temperature control was not commonly practiced and lube oil cooling was often unnecessary. It is a far cry to the days when the rugged individualist tried to pattern his engine after himself and make it independent of all accessories—in some instances, believe it or not, even the oil and fuel filters were left out and gauze strainers were all that went with the engines. In due course a group of men represented by engine makers, the insurance companies and the technical press got together and learned by investigation that over half the engine accidents were traceable to cooling. A great boost was given to the use of heat exchangers by an insurance premium placing considerable burden upon the use of engines without fresh water closed cooling systems installed.

Over a period of time and perhaps to some extent still, the makers of heat exchangers had their problems, especially with sea water and this in turn gave the metallurgists and the tube makers some rough going. However, it was less expensive to pay for tube replacements than for cylinder blocks.

With higher rpm, supercharging and higher bmpc the diesel industry could not keep house without heat exchangers of many kinds, sizes and capacities. The burden of development cost of satisfactory tubes for heat exchangers has been carried largely by makers of steam condenser tubes which over a period of time have been extremely troublesome and more difficult to cope with than the tubes in the exchangers used on diesels.

Great Lakes Shipping Boom

Chicago is grooming itself to become the greatest sea port on the Great Lakes when the Seaway is completed. In this connection there are several matters that the diesel and the shipbuilding industries should take into account. Naturally, American bottoms will be operating out of the Lakes in foreign trade, but we have no reason to expect these ships to be dieselized. We have been through all that in the past and we may as well shelve it for now, at least. The feeder fleets and service vessels

are another matter. As soon as the Port of Chicago and other lake ports become active and ocean shipping really moves in and out, then more tugs, barges, lighters, floating cranes and dieselized cargo handling equipment on land will be needed. At the same time there are many places needing deeper channels and many areas where ships should land that are now exposed to the open lakes, often too rough for ships to remain moored to piers. It is quite possible that some provision must be made for open roadstead operation.

It is already a foregone conclusion that there must be a change in river and canal type boats and barges to enable them to move out on the lakes with safety to vessel and cargo. This in turn means more and different diesel vessels. Right now is the time to be planning to meet the changing demands on the lakes and to give some thought to the probable need of more diesel driven dredging equipment as well as other types of vessels.

The Parts Replacement Business

Diesel engines are very numerous and certain parts must be replaced periodically. Therefore some independent manufacturers endeavor to compete with the engine manufacturers for the parts business. On the other hand engine makers endeavor to control it for a number of reasons. They have produced the best diesel engines they know how to build. The process of developing each part of an engine so it will give the longest satisfactory service may apply to only one make or even to a single model. It is not probable that the process will be made available to all comers. If inferior parts are used the reputation of the engine suffers. Therefore the engine maker must consider more than the profit to be made for his spare parts business.

Engine makers contract for the manufacture of parts from suppliers who are specialists in their fields. Their research, knowledge, skill, manufacturing facilities and quality of product could hardly be equalled in any but the largest engine plants. Such manufacturers seldom attempt to sell parts in competition with their engine makers who are their own customers. Some owners of engines are bargain hunters and they shop for price. As to whether they are right or wrong, save money or waste it, get better or worse results, is not for us to say. What we do know is that most engine owners feel safer when they buy original parts with the engine builder's name on the package as an assurance of quality and dependability equal to that of the diesel engine itself.

There was a time when specialists found ways to make better parts than were supplied by some of the engine manufacturers and their products became so well known that they were called upon to solve difficult problems of durability and dependability. Common weaknesses were attacked by specialists and corrected for the engine makers and for the most part these specialists are now manufacturing for engine companies and the parts they make carry the trade name of the engine for which they are made. From this we must conclude that, generally speaking, the most universal source of parts supply is the engine maker and of special importance is availability on short notice.

Appointed Manager of Plant



Thomas L. Ward

The appointment of Thomas L. Ward as manager of the Alco Products, Inc., plant at Dunkirk, N.Y., was announced by D. W. Cameron, Alco vice president in charge of manufacturing. Ward's appointment is effective immediately. He succeeds W. L. Larson, who has resigned. The company simultaneously announced the appointment of L. W. Eger, who has been production manager of

thermal products at the Dunkirk plant since last year, to Ward's former post, manager of manufacturing services.

Ward has been with Alco since 1937. He joined the company in New York City as assistant chief estimator and later worked in the New York office as assistant chief engineer. In 1953 he was transferred to Dunkirk as executive engineer and a year later was appointed marketing manager of the plant. He was named manager of manufacturing services last September. He is a native of New York City and a graduate of Manhattan College, where he received a bachelor's degree in engineering 1931 and a master's degree in civil engineering a year later.

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AP 174-754



AUTOMOTIVE DIESEL PROGRESS

A COMMENTARY BY MERRILL C. HORINE

Merrill C. Horine, for 38 years a member of the Society of Automotive Engineers, has been actively engaged in automotive engineering, sales promotion and training, advertising and editing of automotive publications since 1907. He has contributed numerous papers on diesel and allied subjects to the SAE and other organizations. An officer in the Air Service in World War I, he was a consultant to the Chief of Ordnance and the Automotive Division of the War Production Board in World War II.

Low-Temperature Diesel Starting

COLD-WEATHER starting of diesel engines presents problems which have brought forth a considerable variety of solutions. These include glow-plugs, dual fuel arrangements, electric resistance heaters, fuel-burning heaters of various kinds, ether injection and even shotgun shells.

Basically, the problem arises from the dependence of the diesel upon the heat of compression for ignition. Thus it is essential that the temperature of the air in the combustion chamber at the moment of injection be high enough to ignite the fuel and air mixture. This depends upon three things:

First, the temperature of the air in the cylinder at the start of compression; second, the compression pressure attained; and third, the loss of heat during compression through absorption and conduction through the cylinder, head and piston.

In warm weather, the ambient temperature of the air and that of the metal parts of the engine are favorable to high enough temperature for prompt ignition; but in cold weather, the opposite is true.

With colder air to start with, the same compression pressure will not raise the air temperature so high and the colder engine will absorb more of the heat that is being produced.

For these reasons, diesels will start without auxiliary aids only down to certain temperatures, varying, of course, with different designs of engines. Below such minimum temperatures, all diesel engines require starting aids.

Some of these act by igniting a small part of the fuel-air mixture in the combustion chamber, as kindling, so that the inflammation will spread to the balance of the charge. This is the action of the glow plug, a simple electrical-resistance heater in the form of a plug, screwed into the combustion chamber, much like a gasoline engine spark plug. Its hot tip is exposed to the fuel spray in such a way as to favor kindling ignition.

Others provide means of pre-heating the intake air, so that entering the cold cylinders at higher-than-ambient temperature, it will attain sufficient temperature when compressed, despite conduction losses, to ignite the fuel. Of these there are several types, divided as between electric resistance and fuel-burning classes.

Electric resistance pre-heaters are sometimes located in the intake manifold, where they are depended upon to heat the air as it passes through. Others are placed in the individual intake ports, as close to the valves as possible, so that they heat only the air actually entering the cylinders.

Both types draw considerable current from the battery and so suffer the disadvantage that they impose a severe drain upon it at the very time that the starting motor is calling for the maximum amperage. For this reason it is the usual recommendation that the heater switch be closed for a brief period in advance of the starter switch and opened at the time the latter is closed.

Obviating this double drain on the battery, fuel-burning pre-heaters employ the regular engine fuel to produce a jet of flame in the intake manifold at the moment of cranking, using a spark plug or glow plug to ignite it. The fuel is usually sprayed by a nozzle under pressure, supplied, as a rule by a hand pump mechanism.

Developed by the M.A.N. company, in Germany, a variation of this type employs a ceramic heat-retaining element in the air cleaner, heated by a burner, to produce a more even dispersal of heat through entire volume of air entering manifold.

Dual-fuel arrangements, whereby the compression ratio is temporarily reduced by withdrawing a displacer or opening a plug valve into an auxiliary chamber and gasoline is introduced into the intake manifold through a carburetor, have never been seriously considered for automotive application, though still in use on some industrial and farm

diesels. These, of course, are provided with spark plugs in the cylinders, so that the engine is started as a gasoline engine. As soon as a start has been accomplished, the gasoline is shut off, the plug valve or displacer returned to full-compression position and the ignition cut off. The engine then functions in the normal manner as a diesel.

Used on some large engines, particularly in the earth-moving industries, are auxiliary gasoline engines which perform in the same manner as electric starters; but these usually in themselves offer no help in overcoming low ambient air temperatures.

Simplest of the auxiliary starting aids is the ether cartridge, by which a measured charge of ethyl ether is admitted to the intake manifold at the moment of cranking. This highly volatile gas ignites at extremely low temperature, so that even though the air in the combustion chamber is well below ignition temperature, the ether will ignite and kindle the charge of diesel fuel.

Once firing commences, by any of these means, sufficient heat will be imparted to the combustion chamber walls, piston head, valves, etc., to support continued engine operation.

These methods are a far cry from the pristine practice of preparing for a start in cold weather by playing a blow-torch flame over the intake manifold or through a port in its side; yet, dangerous and awkward as that method is, it is still practiced to some extent, even in automotive operations.

Each scheme has its adherents to this day; but the electrical aids are losing ground. Glow plugs, while they make much smaller demands upon the battery than resistance-type air heaters, have lost favor principally because of their relatively short life. This is due to their constant exposure to the high temperatures and corrosive gases of combustion, the resistance metal employed in their active elements being particularly subject to corrosion.

... and now please turn to page 61...

Military Traffic Agency

Secretary of the Army Wilbur M. Brucker has announced establishment of a new Military Traffic Management Agency and the appointment of Brigadier General Edmund C. R. Lasher as Executive Director. Secretary of Defense Charles E. Wilson recently announced that a new directive was placing the traffic management responsibility for Army, Navy, Air Force and Marine Corps transportation in one agency. The Secretary of the Army was designated Single Manager. The establishment of the Military Traffic Management Agency is one of a series of actions designed to concentrate authority and responsibility for Defense supply functions which have previously been exercised independently by the several military departments and agencies.

The new traffic agency will oversee all forms of military transportation within the United States. Commercial transportation by rail, highway, air, inland waterway, coastwise and inter-coastal carriers is covered. As executive director of the new agency, General Lasher will manage all commercial freight and passenger transportation used by the Armed Forces. General Lasher has been actively connected with transportation since 1938 when he studied mass passenger rail traffic under the late Mr. Hugh W. Siddall, then Chairman of the Interterritorial Military Bureau of Railroads.

After a brief special assignment to the New York Port of Embarkation in 1939, where he studied transshipment from land transportation to sea transport, General Lasher was appointed Assistant to the Chief, Transportation Division, Office of the Quartermaster General. He became Chief of the Commercial Traffic Branch of the Transportation Division in 1940. When the Transportation Service (later known as the Transportation Corps) was organized in the War Department in 1942, General Lasher was assigned as Deputy Chief of its Traffic Control Division. From 1944 to 1946, General Lasher served as Zone Transportation Officer of the Second Zone with headquarters in New York City, with additional duties as Transportation Officer of the Second Service Command and Transportation Corps Procurement Officer of the New York area. In 1946, General Lasher was appointed Chief of the Movements Control Division in the Office of the Chief of Transportation, and elected National President of the National Defense Transportation Association. After graduating from the Industrial College of the Armed Forces in 1948, General Lasher was assigned to the United States Army General Staff as Transportation Advisor to the Secretary of Defense, and later as the first Executive Officer for the Joint Military Trans-

portation Committee, Joint Chiefs of Staff. In August 1950, General Lasher was transferred to the Far East Command as Transportation Officer of the Eighth United States Army in Korea. He returned to the United States in 1951 to become Commandant of the Transportation School at Fort Eustis, Virginia. And on August 1, 1954, General Lasher returned to the Office of the Chief of Transportation to become Assistant Chief of Transportation for Traffic.

East Coast Appointments

J. E. Barthmaier is the newly named New York Branch Manager for Enterprise Engine & Machinery Co., San Francisco. Following Barthmaier's transfer from Boston, Ray Baumann has been appointed Boston Branch Manager. And in a third appointment by A. W. Ostrander, Enterprise general sales manager, E. W. Robinson has been named Philadelphia District Sales Manager.

Barthmaier's 22 years in the diesel field include the four past years as Boston Branch Manager for Enterprise. At New York, he is now in full charge of the company's sales staff and extensive parts warehouse there. With 8½ years experience in diesel operation, design, and sales, R. F. (Ray) Baumann has been with Enterprise since mid-1954, serving the diesel field in Maine, New Hampshire, Vermont, Massachusetts, and the east end of Connecticut. Baumann's background includes degrees in mechanical engineering and business administration.

E. W. Robinson manages Enterprise sales in Delaware, Maryland, Virginia, North and South Carolina, eastern Pennsylvania, and portions of New Jersey. Particularly serving diesel requirements of the marine and stationary industry, Robinson has had extensive marine experience on the entire Eastern seaboard over a period of 15 years. He is a member of the Society of Naval Architects and Marine Engineers.

Tip on Settings and Balance

Proper timing, settings, and balance should rate top priority for the efficient operation of a diesel engine. If improper combustion or lack of power is noticed, the operator should immediately check for low compression pressure or improper timing. Also check the following points: 1. Incorrect Injection Timing. 2. Incorrect Injection Pressure. 3. Plugged Fuel Oil System. 4. Fuel Leaks. 5. Sticking Fuel Nozzles. 6. Sticking, worn, or leaking inlet and exhaust valves. 7. Improper or Low Grade Fuel. 8. Water in fuel. If improper combustion continues, the operator should check for any unbalance of the load between cylinders.

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View shows one of two Young Type R Heat Exchangers used to cool lube oil and jacket water of Fairbanks-Morse dual-fuel engine, 1920 HP.

Young Heat Exchangers Cool Municipal Power Engines

There is an extra measure of responsibility which falls on equipment supplying the power and light for an entire community. That is why all component parts of this equipment must be designed, engineered and manufactured by top specialists in their field. With this in mind, Corning, Iowa, officials specified Young Heat Exchangers for its municipal power plant engines. Young Heat Exchangers have a far-reaching reputation for dependability, compactness, low first cost and economical operation.

Cut-away view above points to good reasons for specifying Young Type R Heat Exchangers . . .

A—removable tube bundle permits outside and inside of tubes to be readily inspected and maintained. B—piping remains undisturbed while removing bonnet and bundle. C—tubes rolled into header and mechanically expanded to form sturdy, reliable joint. D—bundle made of non-ferrous materials for fresh or salt water installations. E—baffle spacing engineered to provide proper turbulence of fluid for maximum heat transfer. F—for horizontal mounting; flat end plate for vertical mounting also available.

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Mid-Continent Diesel News

By Jack F. Cozier

SOCONY Mobil Oil drilling rig working for Companhia Dos Petroleos De Portugal and Mobil Exploration Portugal, Inc., on a location six miles south of Lisbon, Portugal, has for power six Cum-

mins NHRS-600 diesels. The rig includes a Unit Rig U-15 drawworks, Unit Rig U-14 pump drive and an Emaco D-500 slush pump. The package was sold by Mid-Continent-Cummins Export.

REED Drilling Co., Tulsa, Okla., purchased a 600 cu ft Joy air compressor powered by a GM diesel engine. The unit was sold by Butler-Sparks Equip-

ment Co., Tulsa, for installation on a drilling rig.

H. C. PRICE CO., Bartlesville, Okla., bought two Cat D8 tractors from McCormick Machinery Co., Tulsa, Okla. The two tractors will be used for pipeline construction.

KANSAS City Bridge Co., Kansas City,

Mo., is repowering their work boat, *The Robert M. Hoover*, with a GM model 12003-C diesel Starboard Marine Propulsion unit from K C Diesel Power Co., North Kansas City, Mo.

ATLANTIC Refining Co., Dallas, Tex., has purchased an Allis-Chalmers K-428 gas standard oilfield power unit from Allis-Chalmers Mfg. Co., Dallas, Tex. The unit will go into service in the Corpus Christi, Texas area.

HALLMAC Construction Co., Houston, Tex., received two Oliver OC-12 tractors with hydraulic side booms for distribution work in Spokane, Washington. The units sold by Midwestern Engine & Equipment Co., Tulsa, Okla., are powered by Hercules diesels.

MULVANE Sand Co., Mulvane, Kan., purchased a GM model 12103 HD diesel engine to power a Thomas 10 in. sand pump at their pit outside of Mulvane. The sale was made by Diesel Equipment Co., Inc., Wichita, Kan.

BOMAN Construction Co., Tulsa, Okla., has in use a Euclid 14-TDT scraper powered by a Cummins 275 hp diesel engine. The unit, sold by Butler-Sparks Equipment Co., Tulsa, is in use on U.S. Highway 66 out of Tulsa.

SERVICE Pipeline Co., Tulsa, Okla., bought a Chicago Pneumatic air compressor powered by a 4-71 GM diesel from Leland Equipment Co., Tulsa, for use in the Kansas City district.

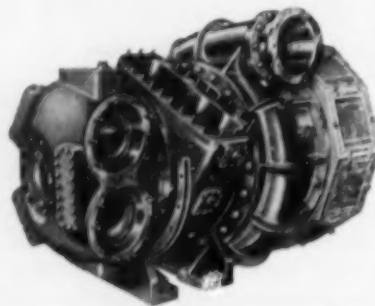
CREEK County road district #3, Oklahoma, has purchased a Cat #12 motor grader for county road construction. The sale was made by McCormick Machinery Co., Tulsa.

CONTRACTORS Machinery Co., Kansas City, Mo., is powering a single drum Skagit hoist with a GM model 4031-C diesel engine from K C Diesel Power Co., North Kansas City, Mo.

HERRING & Davis Drilling Co., Tulsa, Okla., purchased a Joy 600 cu ft air compressor with an International UD-24 diesel engine for power. The unit, sold by Butler-Sparks Equipment Co., Tulsa, will be installed on a drilling rig.

PLACID Oil Co., Goodpine, La., received an Allis-Chalmers K-428 gas engine from the W. L. Somner Company, Inc., Shreveport, La.

CASE Brothers Trucking Contractors, Inc., Gainesville, Tex., include in their fleet for oil field hauling 11 Cummins dieselized vehicles. These trucking contractors move oil field rigs all around West Texas and into other states. Another part of the Case Brothers opera-

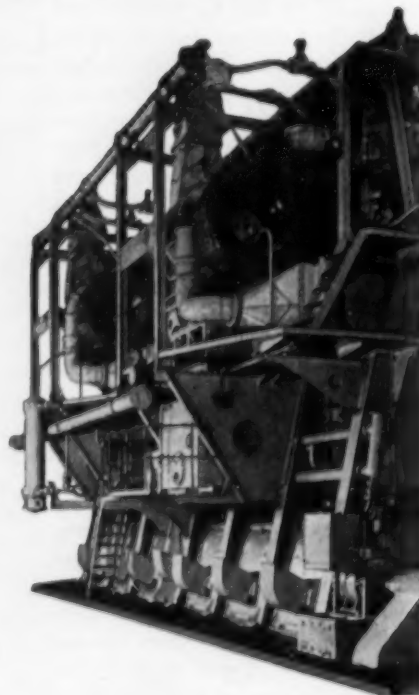


Harland & Wolff chose these Napier Turbo Blowers

Two Napier Type MS 600 turbo blowers are fitted to the Harland & Wolff S.A. 6 single-acting two-stroke Diesel which powers the Blue Funnel Line M/S DEMODOCUS. The S.A. 6 is one of the first engines of its type to be successfully turbo pressure-charged without the use of mechanically driven scavenge pumps. Why did Harland & Wolff choose *Napier* turbo blowers? Here are three good reasons—

- Napier blowers have *high adiabatic efficiency*, resulting in maximum power increase and low fuel consumption.
- Journal bearings on the MS 500 and 600 Napier blowers are sleeve type, and with proper lubrication they will last as long as the engine itself. The MS 500 and 600, the largest blowers in the Napier range, are built especially for marine applications.
- A high standard of workmanship is guaranteed by Napier's long experience in precision engineering.

Napier turbo blowers are available in seven sizes for engines of 140-4,000 h.p. afloat and ashore. Multiple installations for engines of higher powers. On 4-stroke Diesels they can double the power, on 2-strokes they increase it by over 30%—often at a lower specific fuel consumption. Napier turbo blowers are currently in use in 69 countries.



for this engine



which powers this ship

NAPIER Turbo-blowers

D. NAPIER AND SON LIMITED · LONDON · W.3 · ENGLAND

Representative: L. O. Brooks
Suite 909, Dupont Circle
Building, 1346 Connecticut
Avenue, N.W., Washington 6,
D.C. Tel: Dupont 7-2123

CRC T9

tion includes dirt contracting which utilizes among their other units a belly-loading LeTourneau dirt mover powered by another Cummins diesel.

CURRY Construction Co., Antlers, Okla., bought a Cat #12 motor grader from McCormick Machinery Co., Tulsa, Okla. The unit will be used for surfacing construction work.

SOUTHEASTERN Construction Co., Tulsa, Okla., has received two Bucyrus-Erie 22-B back hoes for work on Tulsa sewer jobs. The units, sold by Butler-Sparks Equipment Co., Tulsa, are powered by GM 3-71 diesel engines, one with torque converter.

GEORGE E. Failing Co., Enid, Okla., is installing two Allis-Chalmers HP-326 gas engines on a Failing model 1500 rotary rig to be exported. The engines were delivered by Allis-Chalmers Mfg. Co., Tulsa, Okla.

J. E. CARLSON, Pampa, Tex., purchased a Cleveland 140 trencher powered by an International UD-350 diesel engine. The unit will be used for pipe line work and was sold by Leland Equipment Co., Tulsa, Okla.

TULSA County District #3 Oklahoma bought Cat #102 motor grader for county highway construction work. The unit was sold by McCormick Machinery Co., Tulsa.

JOY Manufacturing Co., Dallas, Tex., received two Allis-Chalmers LO-525 gas standard oilfield power units to be used in conjunction with their compressors. The sale was made by Allis-Chalmers Mfg. Co., Dallas.

REED Drilling Co., Tulsa, Okla., is installing two Joy 315 cu ft air compressors on a drilling rig. The compressors, delivered by Butler-Sparks Equipment Co., Tulsa, are powered by a Caterpillar diesel engine.

HALLMAC Construction Co., Houston, Tex., purchased a Unit 1020A back hoe powered by a GM diesel engine with a torque converter. The back hoe was sold by Midwestern Engine & Equipment Co., Tulsa, Okla., and will be used around Spokane, Washington.

JENNINGS Engine Supply Co., Oklahoma City, Okla., took delivery on an Allis-Chalmers 8MO-1290 gas engine for sale to a drilling contractor in Central Oklahoma. The engine was delivered from Allis-Chalmers Mfg. Co., Tulsa.

SERVICE Pipeline Co., Tulsa, Okla., bought a Cat D6 tractor with a pipe layer from McCormick Machinery Co.,

Tulsa. The unit will be used for pipe line maintenance work.

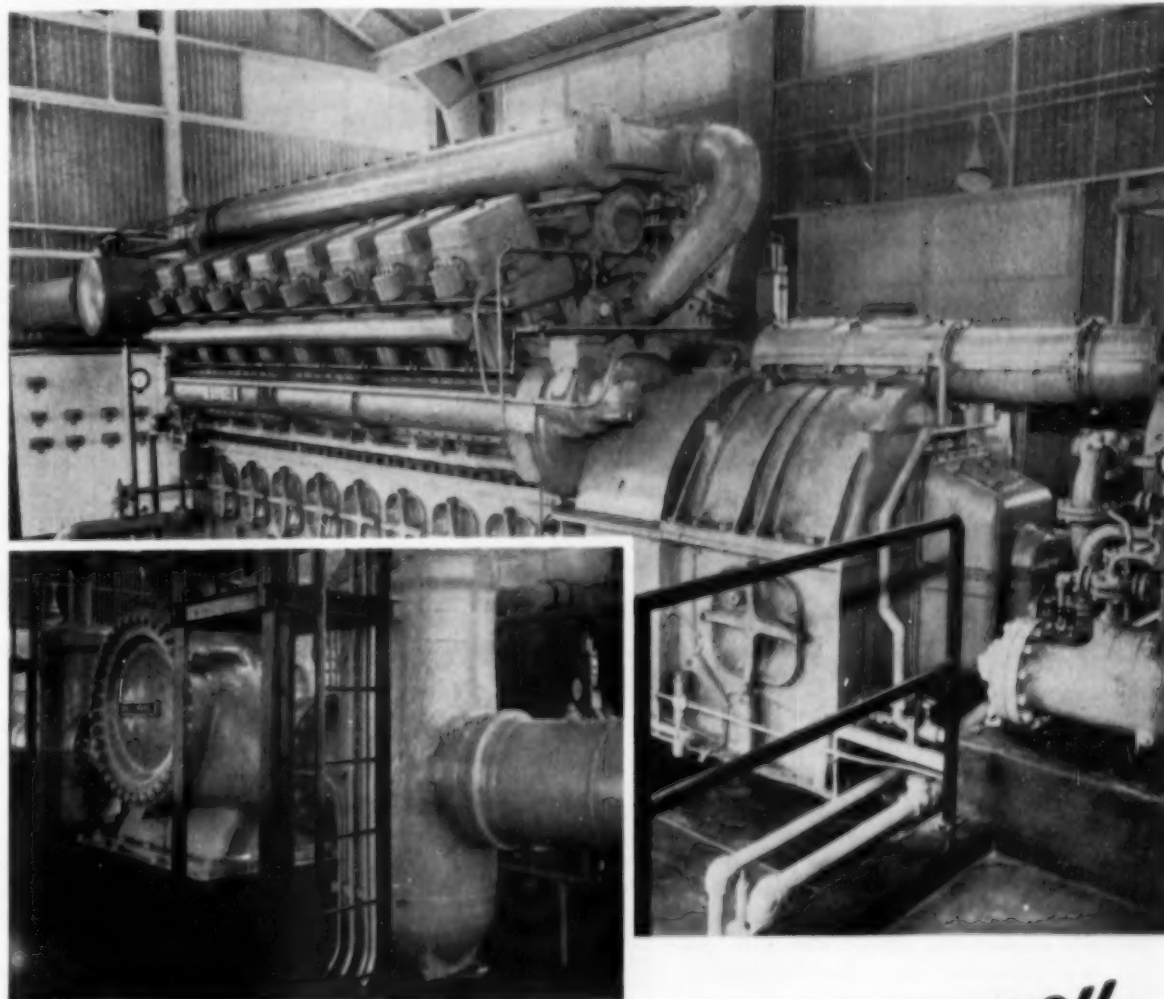
LIST & Clark Construction Co., Kansas City, Mo., is repowering a Euclid 12-TDT scraper with a model 62303-RA GM diesel engine from K C Diesel Power Co., North Kansas City, Mo.

POWER Transmission & Equipment

Co., Seminole, Okla., received two Allis-Chalmers 6MO-893 gas engines and one Allis-Chalmers PC-1879 gas engine from Allis-Chalmers Mfg. Co., Tulsa, Okla. for resale to a drilling contractor.

DON KELLY, oil field contractor, Shawnee, Okla., purchased a Cat D6 tractor for oil field construction work from McCormick Machinery Co., Tulsa, Okla.

IT'S HERE! JUST OFF THE PRESS! Bigger, better, completely revised, rewritten and brought up to date. It's Volume 21 of DIESEL ENGINE CATALOG, now ready for mailing. Mail orders are now being filled for this giant reference book, with its all-new, profusely illustrated engine and accessory sections. Orders are being accepted for this limited edition, which costs \$10 postpaid plus California sales tax where applicable. Send checks or company form orders to DIESEL PROGRESS, 816 N. La Cienega Blvd., Los Angeles 46, California.



THIS COMPRESSOR STATION DEPENDS ON *Massey* GOVERNORS FOR PRECISE POWER REGULATION

A Massey Hydraulic Governor provides dependable control of a Nordberg engine at Transcontinental Gas Pipe Line's Station No. 23, near Houston—the first installation of a Nordberg 16-cylinder Supairthermal® spark ignition gas engine-gear set driving a DeLaval centrifugal compressor.

Whatever your problem of power control for diesel, gas or dual-fuel engines, you can solve it with a Marquette or Massey Governor. Our engineering facilities are at your disposal.

Marquette
GOVERNORS

Massey
GOVERNORS

MARQUETTE METAL PRODUCTS DIVISION

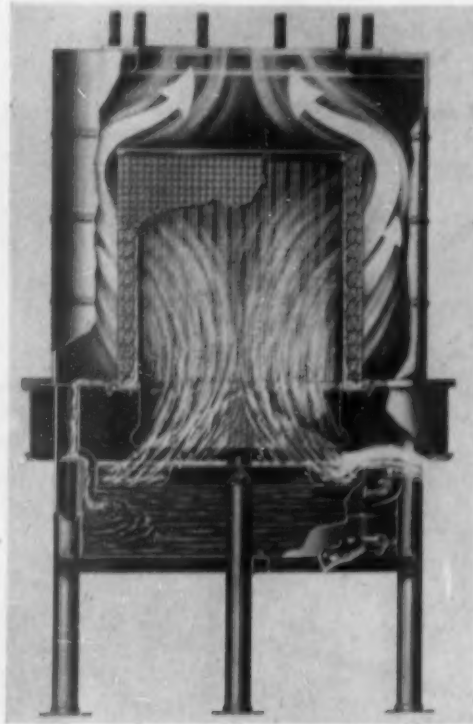
CURTISS-WRIGHT

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Other Marquette Products: ROLLER BEARING TEXTILE SPINDLES
WINDSHIELD WIPERS FOR AIRCRAFT • SPRING CLUTCHES
ROTARY OIL PUMPS • PRECISION PARTS AND ASSEMBLIES

Oil Bath Air Filter

A new oil bath air filter which combines high efficiency with low pressure loss has been announced by the Air-Maze Corporation, Cleveland filter manufacturer. The new LPD achieves low-pressure-drop operation without any moving parts or any



outside energy supply. The result will be to make economical oil bath filtration available for use with a much broader range of compressors, blowers and engines of all sizes.

Oil scrubbing has long been an accepted method of cleaning intake air, but in the case of some equipment (such as turbocharged stationary engines) the energy required for oil-bath filtration, in the form of static pressure loss, has been very great. The usual solution was to supply the required energy from an outside source in the form of a moving curtain or motor-driven oil pumps, but this new filter has small energy requirements, making it possible to eliminate power-consuming motors and all other moving parts. This was accomplished by reversing the conventional oil and air circuit. In the LPD filter, air is drawn in under a weather hood set low on the unit and is directed through an air-flow regulator tube to an oil control pan. Here the air picks up droplets of oil which are carried up through a diffuser cone where air and oil are thoroughly mixed and air is scrubbed. The air then passes through the cylindrical filtration element where dirt particles and oil droplets are removed, permitting only clean, oil-free air to flow to the engine, blower or compressor. Oil and the dirt it has collected flow down inside the filtration element and through oil-return pipes to the sump where dirt settles out. Clean oil is metered from the top of the reservoir into the oil control

pan through calibrated holes in the sides of the pan.

The air-flow regulator tube is pre-set at the factory so that, within a filter's rated capacity range, air velocity will be sufficient to insure full oil-washing, yet keep pressure drop low. Tests with a standard air cleaner fine dust showed a high level of efficiency for the LPD with 97.5 percent of the dirt arrested, according to the manufacturer. To give some conception of the low pressure drop achieved with these high-efficiency filters: the smallest of the four models recommended for variable speed engines and compressors has a capacity range from 800 cfm to 3500 cfm with a pressure drop of 0.6 in. water gauge at the minimum and 4.8 in. at the maximum. The largest of the models for constant speed engines and compressors range in capacity from 6,500 cfm to 24,000 cfm with a pressure drop ranging from 1.9 in. to 3.5 in. An unusually large oil reservoir has capacity for large accumulations of dirt, permitting long operation before servicing. To make servicing easy, there is a quick-opening drain valve and the weather hood and oil sump are arranged for easy disassembly.

A special bulletin describing the LPD oil bath filter; listing sizes, capacities and pressure drops; explaining selection of correct filter size; and detailing the servicing procedure is available from the Air-Maze Corporation, 25000 Miles Road, Cleveland 28, Ohio.

Investment Casting For Turbochargers

By William A. Dunn*

The theoretical basis for turbocharging is well established and accepted. As a matter of fact, the practical necessity for an additional exploitation of the potential of a given diesel unit has long been felt. It remained for the development of a practical diesel turbocharger to most efficiently meet this demand. The economics of the fabrication of a turbocharger was a secondary problem of almost equal importance to efficient design, once the latter was established. It was painfully clear that the power advantage of a turbocharger had to be supplied with a minimum of additional cost to the basic unit. It was also conversely true that these advantages should translate themselves into tangible benefits for engine operators such as reduced engine weight per hp, more hp per cu in. of displacement and reduced fuel consumption per hp hr of operation.

It was in the so-called heart of the turbocharger, the turbine wheel, that the investment casting made its contribution. The logical choice of a high-temperature cobalt alloy for this complex configured component precluded machining as an ultimately economical method of forming. A casting process that would give superior internal characteristics and hold secondary machining to a minimum had to be supplied. Wheels are being cast in many alloys including Inconel X, Crown Max, N-155, Stellite 31, 4140 and 410. Through use of invest-

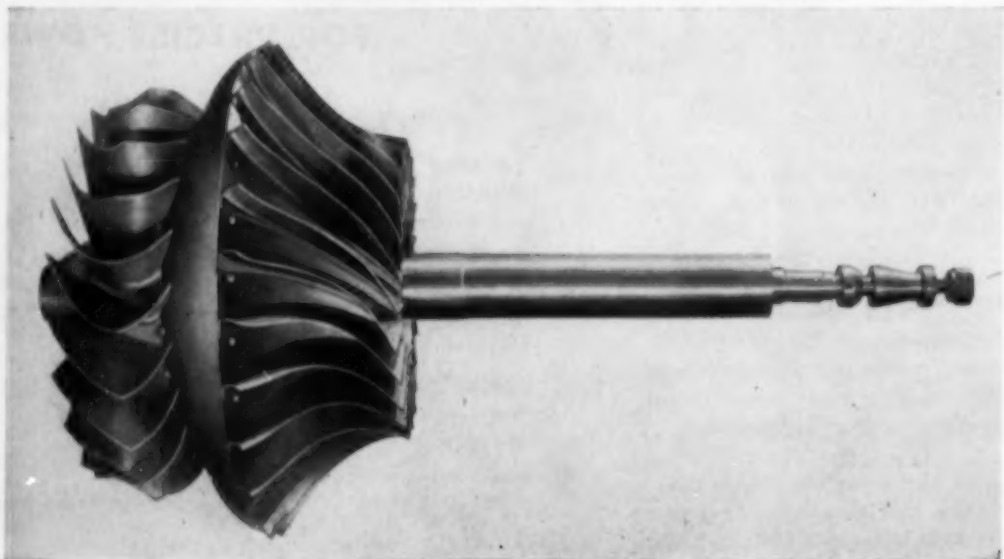
ment casting, wheel designs are made possible that formerly could not be machined or sand cast due to the thinness required on the vanes. Improved performance is gained in investment cast wheels by obtaining smoother surfaces, more exact contours, better dimensional control and a better balanced turbocharger wheel.

Considerable dollar savings have been effected due to performance improvement, greatly reduced machining operations and less labor time. In one case,

the ratio of total cost in producing an investment cast wheel to the cost of a sand casting was 1 to 13. Wheels are currently being cast in diameter from 2½ to 17 in. for turbochargers.

Austen's experience has been with such turbocharger manufacturers as Elliott, AiResearch, DeLaval Steam Turbine and Miehle-Dexter. To preserve these necessarily high quality standards in production, each wheel is subjected to complete gamma ray and fluorescent penetrant inspection.

DeLaval turbine-compressor turbocharger wheel made by investment casting process.



*Sales Engineer, Austenal Laboratories, Inc., Microcast Division.

... continued from page 56 ...

Automotive Diesel Progress

By Merrill C. Horine

Fuel-burning pre-heaters make such small demands upon the battery that they may be ignored; but they do pose a maintenance problem. Chief objection, however, is their susceptibility to misuse by drivers. Many of these have formed the habit of operating the pre-heater pump, without the spark, as a means of supplementing the amount of fuel injected by the nozzles, as an aid in surmounting steep grades.

Needless to say, such abuse is harmful to the engine, since the extra fuel thus introduced is mixed with the air during the intake and compression strokes and is in excess of the amount for which air is available. Poor combustion, excessive smoking and heavy detonation are the inevitable results. Naturally economy suffers; but most important of all, the uncontrolled burning and incomplete combustion result in rapid carbonization of rings, valves and injection nozzles. The gain in actual pulling power, moreover, is usually either non-existent or trifling.

Much the same sort of abuse would be possible with the ether cartridge equipment if its use were sufficiently convenient to the driver. Most manufacturers have been wise enough, however to locate the ether injector where the driver is obliged to leave his cab to operate it. Moreover, the cost of the ether cartridges undoubtedly serves to discourage such misuse.

Air and hydraulic starters, which of late have found their place on vehicular diesels, assist in cold-weather starting by spinning the engines at higher speed than the electric variety do. This alone raises the air temperature by decreasing the time available for heat transfer to the walls of the combustion chamber.

Under arctic conditions, of course, the simple aids so far considered are wholly inadequate and recourse has to be taken to elaborate extraneous heating devices to pre-heat not only the intake air; but the engine block, the coolant, the oil, chassis parts and even the fuel.

Considering the cost in fuel and unnecessary wear and tear on the engine involved in the all-too-prevalent practice of overnight idling of engines, these auxiliary starting aids merit the consideration of every user of dieselized equipment in cold climates.

Modern Plant



A new and modern plant combines the general offices and manufacturing facilities of Wm. W. Nu-

gent & Co., Inc., manufacturers of oiling devices. The address of the new plant, located in a suburb just north of Chicago, is 3440 Cleveland Street, Skokie, Illinois. Previously the company's facilities were located in Chicago.

The new building is of single-floor construction, completely fireproof and air-conditioned throughout. The entire production area has permanent daylight on four sides and additional lighting from numerous skylights. Special attention has been paid to the handling of materials by the installation of monorails with traveling cranes. Each truck loading dock is enclosed and heated and has an independent monorail for loading and unloading. The plant includes the most modern facilities for employees'

comfort, and follows the modern trend toward attractive, light and airy factory design. It also brings together under one roof manufacturing operations that were previously divided in two locations. Provision has also been made in foundation and wall construction to permit the addition of a second floor should further expansion be necessary.

Products manufactured in the new plant are the Nugent line of oil filters, oiling and filtering systems, sight feed valves, sight flow indicators, and numerous oiling devices.

A man seldom gets paid for more work than he does until after he has done more than he was paid for for a long time.



EATON VALVES

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Eaton Diesel Engine Valves are produced to meet the exacting requirements of Diesel engine service. Through more than 35 years of co-operating with the country's leading Diesel engine manufacturers, and furnishing valves to them, Eaton has developed a thorough understanding of the problems peculiar to the Diesel field. Eaton's experience is reflected in the outstanding performance records achieved by Eaton-made valves in all phases of Diesel engine service.

Eaton Diesel Valves are produced in a wide range of materials, and in both faced and unfaced designs.

Our engineers will welcome the opportunity to discuss the application of Eaton valves to your engines.



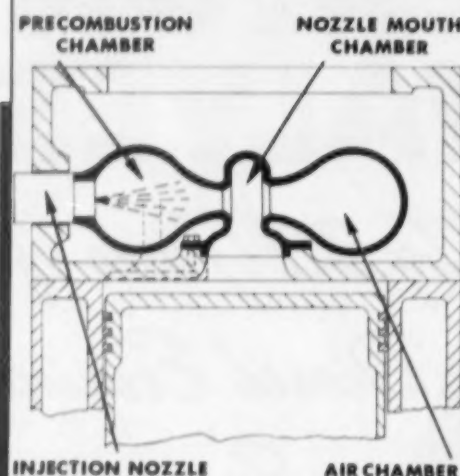
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50% MORE POWER with SCHNEIDER JET COMBUSTION



Burning fluid "torches" do not impinge upon moving operating parts. Peak pressures and temperatures are confined to the combustion chambers.

The engine operates without knocks and smoke. Write for article in "Diesel Progress," December 1955, page 44.

SCHNEIDER

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We grant licenses to manufacturers.

New Plant

A new motor grader and wheel-type tractor plant was dedicated in Decatur, Illinois the week of May 21-25 by Caterpillar Tractor Co. Built to accommodate the company's growing production of wheel-type tractors and motor graders and release facilities at Peoria for added output of crawler tractors and diesel engines, the new plant is situated on a 425-acre plot of land less than a mile northeast of Decatur. Strikingly similar in appearance to the Caterpillar plants at York, Pennsylvania; Joliet, Illinois, and the newer buildings at Peoria, the Decatur plant yet has its own individuality and incorporates in its design the best lessons learned from previous plant construction and latest manufacturing methods.

The two main buildings provide more than 840,000 sq ft of manufacturing and office space. The manufacturing building—730,400 sq ft in area—is of aluminum painted corrugated steel sheathing. It is double-walled and equivalent to two stories high all along its 830-ft width and 880-ft length. Two assembly lines extend nearly the entire length of the plant.

Adjoining the front half of this building is the two-story brick administration building which provides 53,581 sq ft of office space on two floors. This building houses in addition to most of the plant offices, the medical section and an auditorium seating 255 persons. Unusual in its accessibility to both factory and office people is the 1160-foot-long mezzanine floor which cuts across from the second floor of the administration building nearly half the front and entire length of the manufacturing building. Approaches from both the office area and along its length in the manufacturing building make it the logical place for the general factory office, training and safety offices, locker rooms, a conference room, and a plant cafeteria which seats 372 persons. The mezzanine, a convenience for both office and manufacturing people, provides 57,200 sq ft of space above the manufacturing area.

In addition to these main buildings, the plant site includes a bituminous-surfaced parking area for 1,150 cars, and 12 other buildings such as the heating plant, fixture storage building, switch house, industrial waste disposal and lumber storage buildings. In all, 19 acres are under roof. A 300,000 gallon water tank holds water for general plant use, and a reserve for fire protection. Concrete paved yards on three sides of the manufacturing buildings provide ample storage for castings and forgings. Finished products ready for shipment are stored on a graded area east of the manufacturing building.

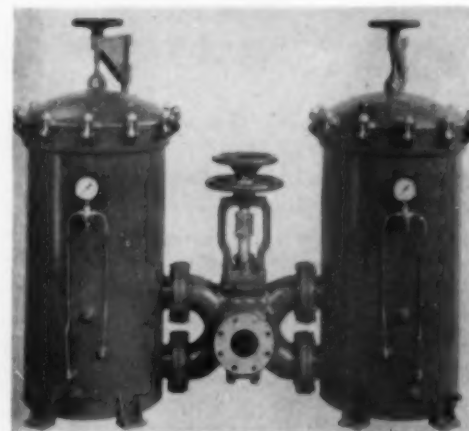
Flexibility of manufacturing operations is built in the new Decatur plant. Overhead clearances, for example, with the exception of extra height for heat treat and 34-ft high crane bays, aren't tailored to specific operations. The entire manufacturing building has a minimum 20-ft clearance from floor to truss. Flexibility is also evident in the provisions that have been made for utilities. Electric power is supplied along every bay line by a bus duct system which provides adequate power for any future rearranging of production equipment that may be required. One central compressed air station feeds

air to every building column throughout the plant, providing for all immediate and future needs. A complete network of steam, gas, water and sewer lines serves immediate needs in the manufacturing building and is adaptable to any new requirements improved methods or rearranged production facilities may bring.

Provisions for recently announced expansion were made in the original design. Offsite water, gas and sewer facilities are approximately 50 per cent oversized. Heating boilers are approximately 30 per cent oversized, and the compressed air station 25 per cent oversized, with foundations, electric motors, piping and controls already provided for the addition of another unit, which would add 33 per cent. All railroad sidings are situated so that very little, if any, relocating would be required in the event of a building expansion. Other plant services and utilities of note are the modern air conditioning and ventilating systems, waste treatment plant, fire protection program, medical facilities and the ease of maintenance which has been built into the entire structure.

Stretching through the north half of the manufacturing building for almost the entire length—800 ft—are the two assembly lines on which the Decatur-built Caterpillar machines will move into final assembly. On one of the lines, the three motor grader models, No. 12, No. 112, and No. 212 are assembled. The wheel-type tractors are assembled on the second line. These include the DW15, DW20, and DW21. From the assembly lines, the machines move onto the final adjustment floor, then to the paint booth located adjacent to the north wall of the plant. There they are spray painted and readied prior to shipment out of the plant.

Duplex Lube Oil Filter



A new large capacity duplex full flow lube oil filter is now available from Wm. W. Nugent & Co., Skokie, Illinois. The unit consists of two parallel filters with a flanged switching valve supported between them. Each filter is equipped with a three-way cock and differential pressure gauge. A cover lifting mechanism facilitates cover removal and exchange of filter recharges.

Each filter comprising the duplex has a capacity of 225 gpm of 150 sau viscosity lubricating oil at about 5 psi pressure drop. They may be operated independently or in parallel.

The filter cartridge is a laminated, crenulated fiber disc type affording filtering action both through proximate discs and adjacent portions to provide maximum filtering capacity. It is an extended area filter (actual filtering area is greater than the area of its container) having high flow rate at low pressure drop combined with the fine filtering absorption and neutralizing properties of a depth type filter. The filter recharge is expendable. Full details are available from Wm. W. Nugent & Co., 3440 Cleveland Street, Skokie, Illinois.

Assistant to Vice-President



W. L. Larson

Wilford Leroy Larson, formerly general manager of the Thermal Products Divisions of Alco Products Corporation, has been named assistant to Clifford A. Sharpe, vice-president of operations, American Bosch Arma Corporation. Before his promotion to general managership of the three Alco divisions, he was manager of the ordinance division of the old American Locomotive Corporation in charge of the M-47 Tank Program.

Promoted to Sales Manager



A. D. Bogus

Promotion of A. D. Bogus to Sales Manager of the Industrial and Oil Field Division was announced recently by F. M. Young, President of the Young Radiator Company, Racine, Wisconsin, and Mattoon, Illinois. Bogus, who has been Assistant Sales Manager for three years, will be responsible for sales of the company's line of Engine Jacket Water Coolers, Intercoolers and Aftercoolers, Evaporative Coolers, and other cooling and condensing units sold to engine and compressor manufacturers and to the oil, gas and processing industries. A graduate of Marquette University in Chemical Engineering, Bogus joined the Young Radiator Company in 1946 after four years duty in the U.S. Navy.

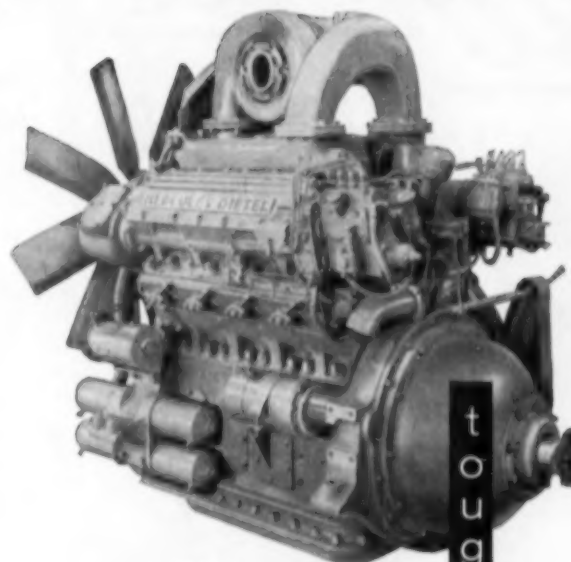
Fuel Oil Division Head



W. T. Robinson

W. T. Robinson has been named head of the newly formed fuel oil division in the Du Pont Company's petroleum laboratory. This new division is to provide improved customer service by correlating laboratory work and field technical service. Mr. Robinson is responsible for technical service on diesel oils, home burner oils, and jet fuels. Having worked in the field of additives since 1943, the Du Pont fuel oil specialist has had extensive experience in the use of additives in all types of distillate fuels. He joined the Du Pont Company in 1952, and assumed his new duties following several years in technical sales.

THREE MORE HERCULES ENGINES TCD's



TCD-1468 500 H.P.



TCD-501 180 H.P.



TCD-895 318 H.P.



Turbo Charged Diesel

Following the Hercules policy of providing industry with the latest in engine developments, the above Hercules TCD's are available for applications requiring Tough Compact Dependable power. Complete details on these TCD's are available from the factory. Write for Bulletins D-534, D-561 and D-567.

HERCULES MOTORS CORPORATION
CANTON, OHIO

Sales Appointments

Caterpillar Tractor Co., Peoria, Ill., announces the appointment of E. C. (Chappie) Chapman as sales manager of the Eastern Division. He formerly was assistant manager of this division. W. E. McCoy, former sales manager of eastern division, has been transferred to the San Francisco office which is head-

quarters for the two western divisions. Chapman graduated from the University of Cincinnati with a civil engineering degree in 1942. He served in both the European and African theaters in World War II. He joined Caterpillar in 1945.

Frank Foster, presently assistant sales manager of the Southwest Division, will transfer to the Peoria office to assume

the duties formerly held by E. C. Chapman. Foster obtained a B.S. degree from the University of Wisconsin. He served in several responsible positions prior to joining Caterpillar in 1945. Ralph Ehni, now serving as district representative in the Northwestern Division, will be assigned the duties formerly held by Frank Foster. Ehni, a graduate of University of Illinois, has been with the company since 1942 after a hitch in the Navy. Prior to becoming a district representative, Ehni worked in the governmental division office in Washington, D.C. All the above changes were effective May 1, 1956.

Big Trucking Purchase

Stanley L. Wasie, President, Merchants Motor Freight, Inc., St. Paul, Minnesota, announces a \$4,000,000 capital program which includes the purchase of 117 diesel over-the-road tractors and 124 trailers.

"Delivery on all units," reports Mr. Wasie, "is expected to be completed by August 15. This purchase represents a 100 per cent replacement program of our over-the-road fleet. The swing to Cummins diesel driven equipment was made following months of study, during which time we examined many types and makes of trucks. We believe that for our operation, the new equipment on order is the most efficient and economical possible."

Specified by Merchants were 117 Kenworth CBE (cab-beside-engine) tractors, powered with 200 hp Cummins NHB-600 diesel engines. The trailers purchased were Trailmobile aluminum, with a 38 ft length. The Kenworth tractors were ordered from Rihm Motor Company, St. Paul, who worked with Cummins Diesel Sales Corporation on engine specifications. Mr. Wasie expects his Cummins powered Kenworth tractors will average 150,000 miles per unit, per year, on routes through Minnesota, Iowa, Colorado, Nebraska, Kansas, Missouri, Illinois, Michigan, and Ohio. Merchants has major terminals located in St. Paul, Minneapolis, Minnesota; Chicago, Moine, Illinois; Denver, Colorado; Omaha, Nebraska; Kansas City, St. Louis, Missouri; Des Moines, Cedar Rapids, Waterloo, Iowa; Detroit, Michigan; Toledo and Cleveland, Ohio.

Besides Mr. Wasie, officers of the company include: Frank V. Fetzner, Secretary-Treasurer; Mel Johnson, General Operations Manager; and Carl A. Holmgren, Vice President-Sales. During 1955, Merchants dollar volume was in excess of eight-and-one-half million. Merchants Motor Freight was founded in 1928 by Mr. Wasie, who in the early days of the company drove a stake truck between St. Paul, Minneapolis and Des Moines.

Among the many firsts credited to Merchants Motor Freight are: First to use mechanical conveyors on loading docks; first to power washers for vehicles; first in the Midwest to use air operated dock boards; first trucking company to install an engine dynamometer in their shop; and the first carrier to be certificated by the Interstate Commerce Commission to carry their own insurance.



• Here is AMERICAN GEAR's new PGT transmission as used with a Chrysler engine to power a gasoline tractor. This new, hydraulically operated compound planetary transmission has been successfully used on earth movers, road rollers, tractor loaders and other equipment.

• Complete performance tests at one of the country's leading Institutes of Technology have verified PGT's outstanding performance. The report on these tests describes PGT as "offering a simple, versatile and extremely flexible means of power transmission...good efficiency...conservatively rated."

• PGT offers these important advantages over more complex transmissions...

- Easily operated by anyone by merely moving a single hydraulic control lever
- Practically instantaneous (1.5 seconds) change of speed or direction without shifting gears
- Only one control valve lever for all speeds and neutral
- Utterly smooth...no shock...no jerk...no noise
- Cushion shift prevents shock loading, eliminates trouble
- Eliminates operator fatigue by eliminating clutch pedal
- Hydraulic control lever placed convenient to operator without regard to location of transmission
- Planetary gearing means considerably less length for comparable loads and speeds
- Positive pressure-fed lubrication to bearings and gears

• Two power take-off apertures can transmit up to one-third of engine output maximum

* Complete report on request

Write today for this new 8-page booklet which gives complete information, design details on all 7 models of PGT transmissions

7 DIFFERENT MODELS • 85 OR 150 TO 200 LB. FT. TORQUE
1 OR 2 SPEEDS FORWARD • CHOICE OF REVERSE RATIOS

USE PGT TRANSMISSION ON

Lift trucks • Earth movers • Hoists and cranes • Car pullers • Slushers
Conveyors • Power take-offs • Front end loaders • Road rollers
Other industrial equipment • Truck mixers



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controls you
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MERCID
PRESSURE
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CONTROLS



MERCID TYPES DAE AND DSE
FOR HAZARDOUS LOCATIONS

N. E. CODE

Class I, Group D (NEMA 7)

Class II, Group E, F, G (NEMA 9, 9A)

ALSO

MERCID TYPES DA AND DS

GENERAL PURPOSE

NEMA 1,

For indoor service and other general purpose applications

EQUIPPED WITH SEALED

MERCURY CONTACT SWITCHES

Write For Catalog No. 856

THE MERCID CORPORATION
4211 Belmont Ave., Chicago 41, Ill.

Battery Service Life Extended

New grid alloys and other product improvements have been introduced in a line of batteries for stationary power applications by Exide Industrial Division of The Electric Storage Battery Company, Philadelphia. They are expected to extend service life up to 10 per cent and reduce maintenance requirements. The improvements have been made in the Exide-Tytex flat-plate battery line intended specifically for uses in the electric utility field, signaling, telephone service, emergency lighting and other industrial operations. Retaining basic features, the Exide-Tytex line for the first time includes Silvium positive grids. Silvium, an oxide patented alloy of lead, silver and other metals, has a superior ability to resist corrosion and withstand overcharging.

Transparent containers, with covers effectively sealed to prevent leakage and keep out dirt, are made of strong, lightweight polystyrene instead of glass. Also heat-resistant, this plastic material already has proved itself in stationary battery applications. The improved Exide-Tytex design provides greater space between the plates and the top and the bottom of the jar, substantially increasing electrolyte volume. In normal float service, in which a battery always is connected to a charging line, it is necessary to add water only about once a year to maintain electrolyte level below the plates. The greater volume of electrolyte increases the high discharge capacity of the cell, providing an extra reserve of power when needed.

In addition to the wide application in float services, the improved Exide-Tytex battery also is well adapted to cycle services. The enlarged reservoir at the bottom of the jar provides ample sediment space for even the most severe cycle applications. In larger cells of the line, elements are hung on special insulating channels molded into the jar. Elements of smaller cells are cover suspended and positioned and held in place at the bottom by plastic rods and rubber washers. Highly resistant to chemical and electrical action within the cell, microporous separators and Vitrex retainers insulate the plates. They permit free passage of electrolyte to assure delivery of high rates of current. The retainers hold the active material firmly in contact with the grids, assuring long, trouble-free operations. Exide-Tytex batteries are available in appropriate sizes for applications in all stationary power fields, rated at from 10 to 1064 ampere-hour capacities. Further information may be obtained by writing Department T, Exide Industrial Division, The Electric Storage Battery Company, Box 8109, Philadelphia 1, Pennsylvania.

Engine Purchase Contract

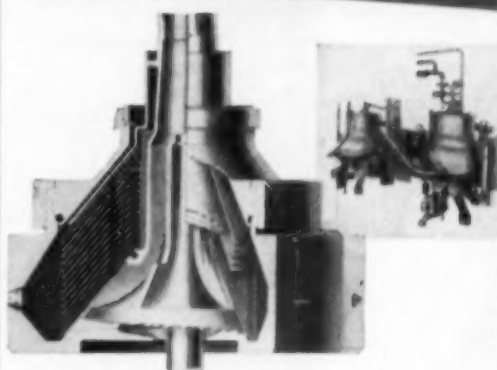
B.C. Power Commission has awarded a \$196,500 contract to Maxwell-Simson & Associates, Ltd., Vancouver, for the manufacture and supply of two more 500 kw mobile diesel generating sets. The Commission already has two of these powerplants on wheels in operation. They were the first of their kind

in British Columbia's electric utility business and have been operating since last December.

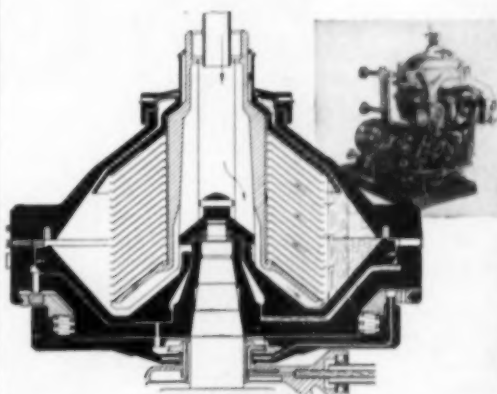
Designed to specifications of Commission engineers, the 35 ft long van-type trailers which house the diesel unit, can be hauled by truck or loaded on to rail cars for immediate dispatch to any part of the province in the event of an emer-

gency. They are fully equipped with auxiliary lighting plants, floodlights, fire-fighting equipment, fuel tanks and all necessary tools. The diesel engines are Mercedes-Benz 12-cylinder V-type, developing 730 bhp continuously at 1200 rpm. The two sister units were the largest of the road transportation type to be built in Canada. The two on order will be identical models.

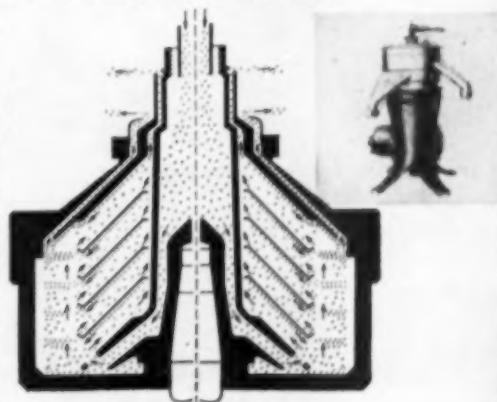
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VIS.	TEMP.	AC-VO	PX 209. F	MODEL 94
500	180° F	1200	600	300
700	180° F	1100	550	275
1700	180° F	660	330	165
2500	180° F	560	280	140
4000	190° F	440	220	110
5000	200° F	300	150	75



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Important Merger

Directors of Federal-Mogul-Bower Bearings, Inc. of Detroit, Michigan, and National Motor Bearing Co., Inc. of Redwood City, California, recently voted to submit to their shareholders a plan to merge the two companies. Announcement of the move was made by G. S. Peppiatt, president of Federal-Mogul-

Bower Bearings, Inc. and Lloyd A. Johnson, president and founder of National Motor Bearing Co., Inc. Special meetings of the shareholders of both companies to vote on the merger have been set for July 25, 1956. Approval requires two-thirds majority of the shares of each company.

The merger agreement provides for the

exchange of 10 shares of National Motor Bearing Company stock for 7 shares of Federal-Mogul-Bower Bearings, Inc. Federal-Mogul-Bower Bearings, Inc. has enough authorized but unissued stock for this transaction. If the shareholders approve this it will be the third time in three years that Federal-Mogul has substantially increased its size and scope of operations. In December, 1953, it ac-

quired the Bearings Company of America with its complete line of ball bearings. In July, 1955, the Bower Roller Bearing Company with its full line of straight and tapered roller bearings was merged into Federal-Mogul. The acquisition of the National Motor Bearing Co. will add an important line of oil seals and other products.

Mr. Peppiatt said that if the deal is approved by the shareholders, the National Motor Bearing Co. will be operated as a division of Federal-Mogul-Bower Bearings, Inc. with Milton Bulkeley, now its Executive Vice President and Treasurer, as general manager of the division. He said that Lloyd A. Johnson has agreed to stay on as a special consultant and advisor. In commenting further on the proposed merger, Mr. Peppiatt said, "National's oil seals are logical additions to our complete line of sleeve, ball and roller bearings and are not competitive with it. Most of our original equipment customers, and we have many in common, use oil seals in some form and the addition of oil seals to our service line will be of great advantage to both of us."

Mr. Johnson said he was very pleased with the proposed arrangement and "it will very materially enlarge the distribution opportunities for our products. Merging with Federal-Mogul-Bower Bearings, Inc. should be of real benefit to our employees, shareholders and customers."

Both Mr. Peppiatt and Mr. Johnson stated that the rights and benefits of National Motor Bearing Co. employees would remain unchanged. In 1955 the National Motor Bearing Co. did a total business of \$19,000,000, its total assets were more than \$10,500,000, it had 2,000 employees and 1,800 shareholders. During the same year Federal-Mogul-Bower Bearings, Inc. had total sales of \$85,000,000, assets of \$45,000,000.

New Field Compressor

The new CFA packaged compressor introduced by Clark Bros. Co., one of the Dresser Industries, has been specially designed for oil and gas field use. It is well suited to gas gathering, gas lift, and other applications requiring a unitized compressor station in the 75-200 bhp range. The unit consists of a newly designed Balanced/Opposed compressor which is mounted on a steel skid and is direct-driven by an oil field type gas engine. A radiator is included to permit intercooling of the gas between stages and to also cool the lube oil and compressor cylinder jacket water. A scrubber and dump trap can also be provided to remove condensate and moisture from the gas stream between stages.

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San Francisco, Calif., 870 Harrison St. Tel.: Dorville 2-1931
Seattle, Wash., 1350 Westlake Ave. N. Tel.: Adler 1440
Wilmington, Calif., 433 Marine Avenue, Tel.: Terminal 4-4095



The CFA compressor has been specifically designed for field use. It is of 5 in. stroke and has two horizontally opposed compressor cylinders which project from opposite sides of the crankcase. The unit features the Balanced/Opposed principle of Clark and used on the larger 8 in., 14 in. and 17 in. stroke Balanced/Opposed compressors which are used in the process and industrial fields. In this design the compressor cylinders, which are mounted on opposite sides of the crankcase, are driven from crankshaft throws which are 180 degrees apart. Reciprocating masses are always moving in opposite directions. Therefore, because each reciprocating force is opposed by an equal and opposite force, there are no unbalanced vertical or horizontal forces in the CFA; they are all cancelled out. To be certain that reciprocating masses are equal, all of the reciprocating components including connecting rods, crossheads, piston rods, pistons and locknuts are carefully weighed and matched. Furthermore, because opposing cylinder connecting rods are only separated by the width of one crankshaft web, force couple between the opposing cylinders is negligible. The CFA is virtually vibrationless in operation.

In test the CFA was placed on a perfectly smooth floor and run without being bolted down or restrained in any way. Operating at rated speed and various loads, the unit remained motionless. There was no tendency toward walking. In actual practice, it is recommended that the unit be leveled on a slab of concrete, thick enough to prevent cracking, should it settle because of wet or unstable ground. The CFA is also readily adaptable to operation on floating barges for use in the bayou country, or on trucks and trailers when a portable unit is required.

An oversized radiator of the finned tube type is provided for lube oil cooling, compressor cylinder jacket water cooling, and intercooling of the gas stream between stages if required. Oversizing of the radiator prevents overheating during the extended periods of high ambient temperature encountered in the southwest. The inner surface of the radiator tubes can be readily inspected or cleaned if ever required by removing the plugs immediately opposite the ends of the tubes. The radiator fan is driven from the end of the compressor shaft.

The CFA is designed and constructed to operate at 1000 rpm. Compressor cylinder piston speeds are lower than those encountered in many Clark stationary units. Long cylinder life will result. One of five different makes of proved oil field engines is supplied to drive the unit. The engines are sized on the basis of API hp. They, therefore, operate at 65%

of their maximum hp rating. Oversized engine radiators provide an ample margin of cooling even in the high ambient temperature regions of the southwest.

The engine drives the compressor directly through a flexible rubber block coupling thereby eliminating belt or gear drives. Complete engine safety devices such as high water temperature and

low oil pressure shutdown switches are standard equipment.

ITS NEW

Awards To Salesmen

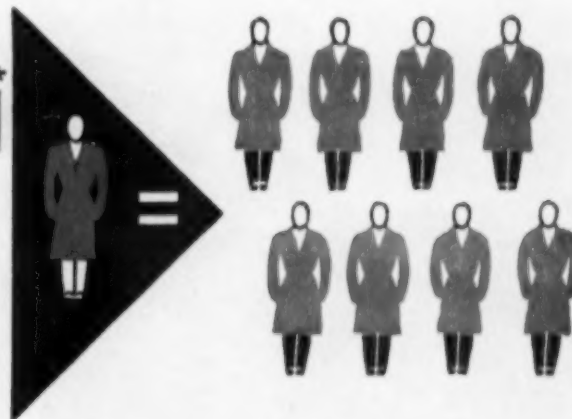
Eight top industrial salesmen who sold the greatest volume of filters and filter elements for Briggs met in a sales and engineering clinic and banquet recently at the Shoreham Hotel, Washington,

D.C., and were presented with certificates attesting to their efforts in engineering and sales accomplishments. The Briggs Filtration Company, manufacturers of filtration equipment, supplies major railroads, major oil companies and industrial and automotive engine manufacturers with industrial oil filters for use on diesel engines and industrial machinery.

With **Liquid Honing*** **One Man Does Work of 8**

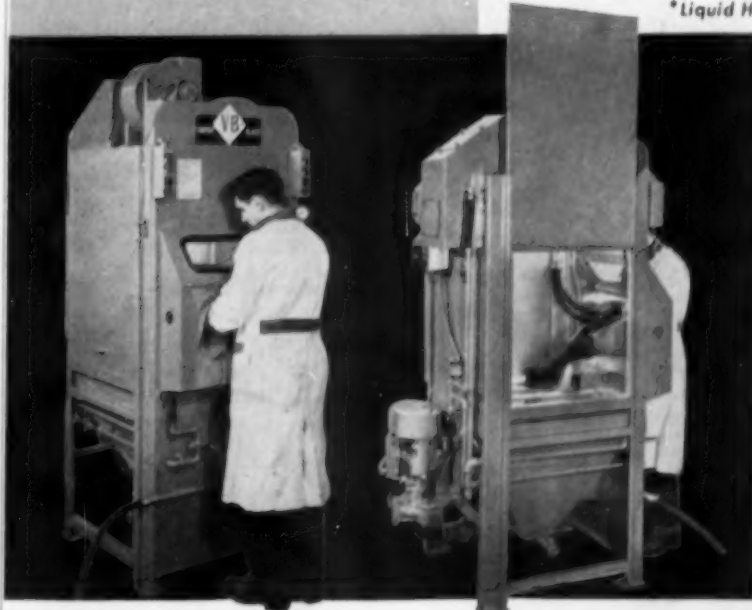


Whatever your production problems — engine overhaul or surface conditioning of parts for O.E.M. — you'll find Liquid Honing paying for itself in a short time.



CONVENTIONAL methods prove slow and inefficient for deburring and cleaning the almost microscopic holes in this Diesel fuel injector cup. But Liquid Honing does the job *eight times as fast* — one man and one machine equaling the former production of eight men using another method. Best of all, Liquid Honing produces a smooth surface that promotes better fuel flow and cuts down gum and carbon deposits.

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Truck Diesels Perform Well

Evaluating the performance of the Company's 10 new Turbodiesel tractors, after six months of service and an average of 60,000 miles per unit, V. R. Kahley, Vice President of Tank Truck Rentals, Inc., Lancaster, Pennsylvania, said: "Our new Diamond T tractors with their 175 hp JT-6-B Cummins Turbodiesel

engines have demonstrated their economy with excellent fuel mileage performance and they also show remarkable roadability characteristics."

Tank Truck Rentals accepted delivery of the Diamond T tractors in late September after running exhaustive tests on two JT-6-B Cummins Turbodiesels that were installed in vehicles originally pow-

ered with gasoline engines. The first two JT-6-B Cummins Turbodiesels have now logged in excess of 100,000 miles. The Lancaster firm currently has terminals in Woodbridge, and Paulsboro, New Jersey; Ambler, Duncannon, Irwin and Midland, Pennsylvania; and Youngstown, Ohio. Petroleum products and liquid chemicals are hauled by the company in New Jersey, Ohio, Pennsylvania, New York, Delaware, West Virginia, and Maryland.

Leo Halpern, General Manager, reports: "To date we have found our weekly maintenance costs to be less on the Turbodiesel units when compared to gasoline powered tractors. In addition, our drivers report that the Diamond T's are able to maintain higher average road speeds and so have cut running time on various fuel hauls considerably."

Both Mr. Kahley and Mr. Halpern expect the Turbodiesel powered tractors to log in excess of 100,000 miles yearly. The new trucks are part of a program that will see one-fourth of Tank Truck Rentals fleet replaced with new equipment annually. The company now operates 145 road units and in a single year the fleet will accumulate a total of 13,000,000 miles.

Offshore Tender

Mr. Bert Bock, President of Deepwater Exploration Co. of New Orleans, has awarded a contract to the Gibbs Corporation of Jacksonville, Florida for the conversion of the M/V *Excello* (formerly an LST) to a non-propelled offshore drilling tender. The conversion, to the designs and specifications of Friede and Goldman, Inc. of New Orleans, will result in a tender generally similar to the type and characteristics of an appreciable number of such vessels now operating in the Gulf of Mexico for major oil companies. This contract to Gibbs Corporation marks the entry of that old established Southern Shipyard as a builder of major offshore floating equipment in the Gulf of Mexico.

Expansion Program

First major step of an extensive expansion and modernization program by American Bosch Arma Corporation to meet increased demands for its defense and commercial products was completed recently, with dedication of a \$1,164,000 addition to the Columbus, Miss. plant of its wholly-owned subsidiary, American Bosch Arma Mississippi Corporation. The addition more than doubles the size of the plant and brings to 212,440 sq ft the total amount of space now occupied by the Mississippi facility. Located on a 40-acre tract on the outskirts of Columbus, the one-story, air-conditioned facil-

ity is more than 700 ft long and will be used for the manufacture of generators, small electric motors, automotive voltage regulators, electric windshield wipers and related products. Besides the Mississippi expansion, for which ground was broken last Sept. 27, the company also is more than half way through a \$1,500,000 modernization program at its American Bosch Division at Springfield, Mass. and is seeking more space to facilitate added defense work of its Arma Division at Garden City, N. Y.

To ease the immediate need for extra engineering and manufacturing facilities at Arma, the corporate general office staff will move from the division plant to offices in nearby Hempstead, N. Y. Some of the Mississippi space will be devoted to new products developed by the American Bosch Division as part of the company's continued efforts to diversify its operations. Renovation of the half-century old main plant of this division, where the American Bosch automotive gasoline injection system was designed and developed, is scheduled for completion this year. The Mississippi plant is air conditioned throughout with the new section having a maximum capacity of 700 tons of central air conditioning. These facilities are so designed that any future expansion of the plant may be done without interrupting operations. The power system has been brought up to requirements by additional transformers and boiler capacity has been increased proportionately.

New Sales Office

The Trane Company, manufacturing engineers of air conditioning, refrigeration, heating, ventilating and heat transfer equipment, has announced that Mr. Richard E. Jameson was appointed sales representative in charge of a new sales sub-office in Sioux Falls, South Dakota. The sub-office of the Trane Des Moines, Iowa sales office is located at 2440 Kenwood Manor. Telephone number is 2-6781. Jameson received a Bachelor of Science degree in mechanical engineering from the University of Wisconsin and graduated from The Trane Company student training program in 1953. Previous to his Sioux Falls appointment, Jameson was a sales representative with the Trane Des Moines sales office.

Atomic Energy Contract

The Atomic Energy Commission has selected the proposal of The Babcock and Wilcox Company to design, fabricate, and operate a liquid metal-fueled reactor experiment (LMFRE). The selection is contingent on negotiation of an acceptable contract. The liquid metal-fuel reactor will be the seventh type chosen by the Commission for its program of research and development



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Write for Bulletin S-2D

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aimed at the achievement of economic electrical power from nuclear fuels. Other types are pressurized water, homogeneous, fast breeder, boiling water, sodium-graphite, and organic moderated. In addition, studies are underway on the gas-cooled reactor concept.

The liquid metal-fueled reactor concept offers the potential advantages of flexibility of operation over a wide power output range, simplified fuel processing, and steam conditions comparable to those in modern conventional generating plants. The concept has been under development for several years at Brookhaven National Laboratory and was favorably evaluated in a recent engineering study conducted by a technical team, drawn from 17 organizations. In addition to design, fabrication and operation of the reactor, The Babcock and Wilcox Company will perform research and development in connection with the experiment. Brookhaven National Laboratory will continue to provide supporting research and development in the general field of liquid metal-fuels. The Babcock and Wilcox Company proposal stated that the Union Carbide Nuclear Company would be a major subcontractor, primarily in the chemical processing of fuel. Present plans are for completion of fabrication of the reactor and start-up of projected experiments in about three years. No site has yet been selected for the reactor.

Heavy Duty Rotary Drill

A new, heavy duty rotary drill for vertical blast holes in mining, quarrying and construction operations has been announced by The Winter-Weiss Co., manufacturers of the Portadrill line of truck, trailer and tractor mounted drills. Known as the Model 6TA, this addition to the Portadrill line has been field tested over a two year period with outstanding results according to company engineers. Mounted on a Caterpillar D6 diesel prime mover, the drill utilizes compressed air for cuttings removal. Two rotary compressors, operating singly or together provide a maximum of 85 psi air pressure with normal drilling pressures of 15 psi. Up to 27,000 lbs. weight can be applied on the bit and using standard oil field roller cone rock bits, the drill averages a foot or more a minute of 9 in. hole in most formations.

The drill is completely unitized with no auxiliary equipment needed. All power is supplied by the tractor engine through a heavy duty transfer case. All controls are located at the rear of the drill where the operator has full view of drilling operations. Dust control and cuttings collector systems are provided as the job requires. Two men operate the rig with complete efficiency although one man

can complete shallow holes alone. Fast penetration, greater mobility, minimum setting-up and moving out time together with a lower initial and lower operating costs are some of the advantages claimed by the manufacturers. Complete specifications on the 6TA or other truck and trailer mounted drills are available from The Winter-Geiss Co., 2201 Blake St., Denver 5, Colorado.

Engine Operation Levels

In the case of increased demands during emergencies, the properly designed stationary diesel engine can be overloaded to 10% of its full load rating for as long as two hours in any 24 hour period. Regardless of increased emergency demands etc., the valuable diesel engine should never be continuously overloaded. A continuous overload operation may not only stick rings and deposits in the combustion chamber, but may result in wear, damage, and greatly increased maintenance costs. To obtain the best combustion from a diesel engine it should be operated between 75% to 100% load. Extremely low operation can also be harmful as it may result in improper combustion which causes deposits in the combustion chamber and crankcase.

Torque Converter Tandems

A 16 page bulletin on its new line of medium and large-sized tandem rollers with torque converter and two-speed transmission is being offered by Huber-Warco Company of Marion, Ohio. Bulletin No. HWT-525 describes in detail the company's 5-8, 8-10, 8-12 and 10-14 ton variable weight models. With cross-sections, cutaways, diagrams and photos the bulletin points out features of the reinforced, all-welded frame; the final drive assembly which is mounted in the frame; Huber-Warco's combination of a torque converter, tail shaft governor, and two-speed transmission; the adjustable guide roll assembly; the removable king-pin housing; all-welded, water-tight rolls; clean-air cooling and ventilating; two completely independent braking systems; variable speed hydraulic steering; dual controls; accessibility for servicing; and close curb clearance.

Special emphasis is given to a graphic explanation on how the company's combination of a torque converter, tail shaft governor, and two-speed transmission improves tandem performance. Bulletin HWT-525 is available from any Huber-Warco distributor or by writing Huber-Warco Company, Marion, Ohio.

Enterprise Sales Assignment

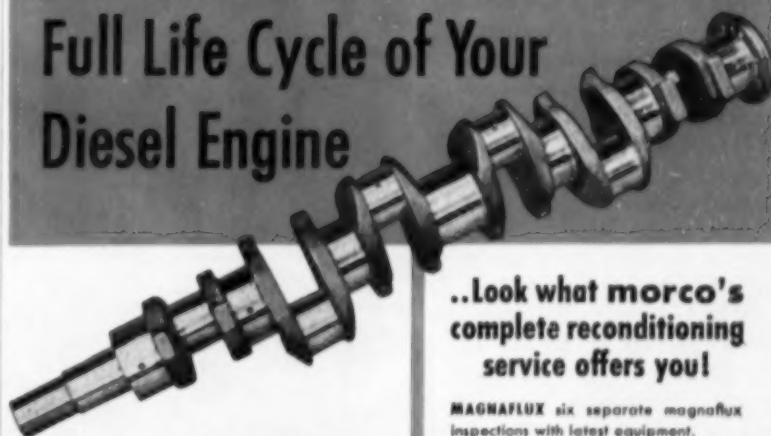
J. L. Roberts, sales engineer, is newly assigned to the Los Angeles branch office of Enterprise Engine & Machinery Co. Named to the territory by A. W.

Ostrander, general sales manager of the San Francisco diesel engine builder, Roberts joins Roy Hogaboom, Branch Manager, to provide special service to marine and contractor diesel needs.

With Enterprise continuously since 1946, Jack Roberts has been associated with the company's New Orleans offices for the past four years.

IT'S HERE! JUST OFF THE PRESS! Bigger, better, completely revised, rewritten and brought up to date. It's Volume 21 of DIESEL ENGINE CATALOG, now ready for mailing. Mail orders are now being filled for this giant reference book, with its all-new, profusely illustrated engine and accessory sections. Orders are being accepted for this limited edition, which costs \$10 postpaid plus California sales tax where applicable. Send checks or company form orders to DIESEL PROGRESS, 816 N. La Cienega Blvd., Los Angeles 46, California.

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Why take chances? Let your dealer be your source for dependable, safe crankshaft regrounding. You get immediate service, guaranteed quality and terrific economy. Ask your dealer about MORCO today.

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consistency in diameter
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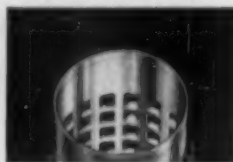
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New core perforation, instead of removing metal from openings, keeps all the metal pronged to give element structural strength and prevent filter media from sagging.

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Lubrication system flow rates are maintained by the free area ratio of perforation. Openings equal up to 10 times amount of oil volume pumped through engine.



Non-corrosive Metal Cores are used sealed with metal rings to insure true flow, add lip strength.

Mid-West Diesel News

By L. H. Houck

REPOWERING of the Nighthawk Freight Service, Chicago, has been completed with the purchase of 10 Cummins Turbodiesels.

NEWLIN MACHINERY CO., Kansas City, has delivered an Allis-Chalmers 844 diesel unit to Wesley Parks at Emporia, Kansas for use on a rock crusher.

EUGENE SELLERS, Houston, Mo., has placed a Caterpillar No. 12 grader in service which was purchased from Fabick & Co., Jefferson City. He will use it in highway construction work.

A NEW horizontal v-type diesel engine designed and built especially for Page walking draglines, has been placed on the market by the Page Engineering Co., Chicago, who manufacture 5 to 15 cu yd draglines. Three models will use the new engine—721, 723 and 728. The new engine consists basically of two banks of horizontal cylinders with one mounted above the other.

AN ALLIS-CHALMERS HD16 with Twin Disc torque converter has been placed in service by Geary County, Kansas, where it will be used for road work. Sale was made by Newlin Machinery Co., of Kansas City, Mo.

FARM TRACTOR dealers are displaying and selling the new Case 300 diesel tractor with 12-speed transmission. The diesel engine has a displacement of 157 cu in., uses aluminum alloy pistons, develops a 35 hp rating with a 4 lb. pressurized cooling system.

MID-STATES FREIGHT LINES, Chicago, has repowered 50 White tractors with 175 hp Cummins Turbodiesels, in a \$2,250,000 fleet improvement program, according to John W. Ferguson, Mid-States transportation vice-president.

U. S. PLYMOUTH DEALERS have word that a Plymouth Savoy has been fitted with a Perkins 4-cyl. diesel engine in London and it has begun a 15,000-mile tour of Denmark, Norway, Sweden and Finland in a 14-week tour. Chrysler is offering the Perkins in England as an optional engine and many American gas driven cars have been converted to this engine. Driving the test car is Herbert Bille Axelson, of the Perkins export staff.

FARM POND business is a continuing market for single tractor units. Mollet & Cochran, Mexico, Mo., pond and terracing contractors have added a Caterpillar D6 to their equipment.

UNIVERSAL MOTOR CO., Oshkosh, Wis., have announced a new series of diesel light weight electric generating sets, powered by 4 cyl engines directly coupled to generators and governed to 1800 rpm and available in 10, 15, 25 and 35 kw.

OLIVER dealers are now stocking the new Oliver OC-18 diesel crawler tractor, using an Oliver diesel developing 161 hp. The new crawler weighs 32,500 lbs. and mounts a full line of allied equipment.

ILLINOIS TERMINAL R.R. is building a light maintenance diesel shop in Decatur, Ill. Plans for the new shop have been completed and construction is expected to start at once.

BRANDEIS MACHINERY & Supply Corp., Louisville, Ky., has opened a new branch in Mt. Vernon, Ill., to serve the southern Illinois area with its line of International tractors, Hough, Bucyrus-Erie, Drott and other equipment. It now has branches in Evansville, Ind., Paducah, Ky., and Middlesboro, Ky.

J. C. BODINE, JR., St. Louis grading contractor, has a new Allis-Chalmers HD-16 tractor with Twin Disc torque converter and used it on the 90,000 cu yd grading contract for the 50-acre Lindbergh-Wauon industrial site on U.S. 66 in St. Louis.

THOMPSON SPECIAL Road District, Thompson, Mo. has taken delivery on a Caterpillar No. 112 grader from Fabick & Co., Jefferson City, Mo.

AN OLD PLYMOUTH locomotive of the 50-ton class, owned by the Dardanelle & Russellville, Ark., Railroad Co., has been repowered with a 300 hp NHRIS-600 Cummins diesel, supplied by the Cummins Diesel Corp., Memphis.

CONSERVATION contractors are turning more and more to heavy equipment. Steed & Hill, of Leavenworth, Kansas, well-known land conservation contractors, recently added an Allis-Chalmers HD-16 with dozer and torque converter to their fleet of tractors. Sale was made by Newlin, Kansas City.

TS-18 TWIN-POWER Euclids are being pushed by Midwest dealers for the big jobs. This scraper is normally powered by two 218 hp GM diesels, one in front and the other behind but where more power is needed 300 hp can be used on both ends. Both engines drive through Torquatic drives. Eucls are now made by the Euclid division of GM at Cleveland. Midwest dealers include Euclid-Memphis Sales, Inc., Memphis; Euclid-Arkansas, Inc., Little Rock; Baton Rouge Equipment Co., Inc., Baton

Rouge, La.; and Euclid Sales & Service, Inc., St. Louis.

LEWIS J. STUCKER, who owns the Little Inch Pipeline Co., Wichita, Kansas, is using a Terra-Trac 600 with Continental diesel and equipped with an angle dozer blade for covering utility line ditches, clearing sites, laying pipe and backfilling.

A CATERPILLAR D4 with Traxcavator has been placed in coal mining service by Wm. R. Carter, Columbia, Mo. Unit was purchased from Fabick & Co., Jefferson City.

PRINCEVILLE STONE CO., Princeville, Ill., has repowered a Cedar Rapids Commander rock crusher with a 300 hp NRT-6-IP Cummins Turbodiesel.

LATEST MODEL Allis-Chalmers motor grader, the AD-45 with A-C diesel engine, has gone to work for Osage County, Kansas. Sale was made by Newlin Machinery Co., Kansas City.

CLYDE HARPER, Dover, Ohio, has converted a Ford F9 truck to diesel by installing a 175 hp JT-6-B Cummins Turbodiesel from the Cummins Diesel of Northern Ohio, Inc., Cleveland.

Malfunction Detector

A new oil-tight and splash-proof malfunction detector anticipates trouble and shuts down rotating equipment before costly damage occurs. Malfunctions such as failing bearings, unbalance, and bent shafts are instantly detected from slight increases in roughness or vibration. Applications include gas and diesel engines, turbines, MG sets and other rotating equipment. When mounted on an engine it will detect a bearing failure, a bent shaft or rod breakage, and instantly sound an alarm, or cut off the ignition, short the magneto circuits, or cut off the fuel supply with a solenoid valve.

The vibration responsive switch is adjustable over a wide range of normal vibration. It is enclosed in a gasketed box with an external reset operator which may be locking or non-locking. Contact arrangements are SPDT, split-contact NO, or split-contact NC rated at 7A up to 440 vac. The unit is, also, furnished in an explosion-proof enclosure for hazardous locations. For further information contact the manufacturer, The Beta Corp., Forest Ave. at Ridge Rd., Richmond 26, Virginia.

Oil Field Pumping Engine

Addition of a two cylinder gas engine to its Power Chief series of small diesel and gas prime movers is announced by

Nordberg Manufacturing Company. Now in production at the company's Milwaukee, Wisconsin plant, Model 4FG2 extends the horsepower range of Nordberg's Power Chief gas engines for oil field pumping service. This new two cylinder model has an API rating of 12-24 hp at 800-1800 rpm. It is equipped with a combination gas-gasoline carburetor and a gas pressure regulator. Safety shut-down controls for low oil pressure/high water temperature are also standard equipment. Additional features which make this engine very safe are an enclosed clutch, enclosed flywheel and an enclosed fan.

With a bore of 4½ in. and a 5¼ in. stroke, this four-cycle engine has a piston displacement of 167 cu in. The compression ratio is 6:1. The radiator is large enough to assure trouble-free operation at ambient temperatures up to 125°F. The Nordberg Power Chief two cylinder gas engine is fully described in Bulletin 242 which is available free upon request.

General Manager

Shareholders of Perfect Circle Corp. recently elected William B. Prosser, vice-president and general manager, and George T. Rea, secretary-treasurer, to the company's board of directors. Their election came after shareholders approved enlarging the Perfect Circle board from eight to 10 members. Prosser has been with Perfect Circle 32 years and its general manager since 1947. Rea, an employee for 25 years, has been secretary-treasurer since 1946. At an organizational meeting that followed the special shareholder session, the Perfect Circle directors re-elected the following company officers: Lothair Teetor, board chairman; Ralph Teetor, president; Prosser, vice-president and general manager; Donald Teetor and Daniel Teetor, both vice-presidents, and Rea, secretary-treasurer.

Storage Battery

Featuring long life and durability even under severe environmental conditions, NICAD's new high output nickel cadmium pocket plate storage battery is proving applicable for diesel engine starting, standby power, switch tripping and closing, and emergency lighting. The active materials, nickel and cadmium oxides, are locked in finely perforated steel pockets formed into plates. Cell containers are made of steel. The electrolyte is a solution of potassium hydroxide. No corrosive fumes are given off on either charge or discharge.

In some trickle and float installations water additions have been as infrequent

as once in five years. Thus low cost maintenance and dependability are of value for remote or unattended locations. For more information write to Nickel Cadmium Battery Corporation, 72 Pleasant Street, Easthampton, Massachusetts.

Clamp Coupling

Eastman Mfg. Co., Manitowish, Wis., announces a new Inter-Lock clamp coupling with grip features obtained by positive positioning of accurately machined insert and clamp. This positive positioning is obtained as the outside rib of the clamp is locked between the collar and hex of the insert, before tightening. The accurate location of the clamp over the insert assures alternate mating of the barbs of the insert with the circular ribs of the clamp. The accurate machining of these ribs and barbs permits the hose to be uniformly compressed into each alternating recess—which multiplies the

holding power—thereby creating the exclusive Inter-Lock grip.

Longer service is assured because hose and wire are not pinched or weakened, as they might be if ribs and barbs were located directly opposite each other, and then drawn tight. Beveled shoulder of barbs permits easy insertion of insert into hose. For low, medium and high pressure hose up to 5000 psi working pressure. Clamps available for hose sizes range from ¼ in. to 2 in. I.D. according to pressure requirements. There are three standard inserts: Male pipe, Male Flare and Swivel Female. Malleable iron clamp is furnished with heat treated bolts. The coupling is for use by manufacturers of equipment for road building, farm machinery, oil field, heavy construction, railway, mining and all heavy duty equipment using hose assemblies. This Eastman Inter-Lock Clamp will also meet the popular demand for a precision made clamp for field replacement.

Murray & Tregurtha

HARBORMASTERS

solve tough marine power and steering problems!



Steer in any direction with full power

Easy service and low operating costs

Protection in shallow water

Lugged, trouble-free performance

Models from 40 to 400 h.p. (Series O-4 illustrated, 40-50 h.p., Gas or Diesel).

You can solve your tough power and steering problems with Harbormaster Outboard Propulsion and Steering Units . . . the complete heavy duty marine power packages. They are quickly and easily installed for immediate use. They are efficient, economical to operate and maintain . . . and they have many special features not found with ordinary marine power, so they are the answer to many tough marine problems.

If you need easily installed power, better steering control, safety in shallow water, easier maintenance, more efficient performance, simpler hull design, more cargo space, bigger payloads, or simplified crew operation . . . you should investigate the benefits of Harbormaster Outboard Propulsion and Steering.

Send for your copy of the new Harbormaster Catalog today. You'll find detailed information and also many interesting Harbormaster installation photos.

MURRAY & TREGURTHA, INC.
6 Hancock St., Quincy 71, Mass.

Please send me New Catalog giving details and showing many photos of Harbormasters in action.

Name.....

Company.....

Address.....

Fill For Housing Site



Solids pumped from the bottom of waters off the Florida Keys are being used to build up land for an exclusive 500-acre housing project near Marathon, Florida. Using a standard Ellicott 10-in. Dragon

dredge the F. P. Sadowski Corporation of Marathon was pumping 300 cubic yards of solids an hour through 1000 feet of pipe to the discharge point.

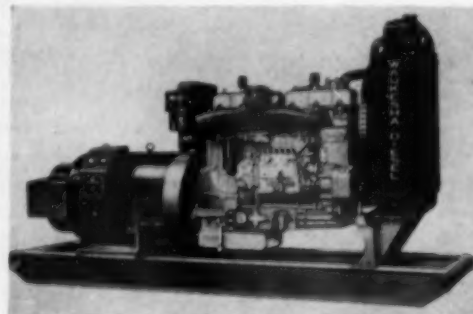
Power on the dredge is furnished by two GM Detroit Diesel engines. A Series 71 Twin-Six diesel drives the 10-in. Ellicott centrifugal pump and a two-cylinder Detroit diesel operates the cutter and hauling winches. To speed up the operation the equipment has worked up to 24 hours a day, seven days a week to accomplish in only five months what could normally be considered a full year's work.

New Tuna Clipper

National Steel and Shipbuilding has launched the

sixth in their current series of modern high speed dieselized Tuna Clippers. Christened the *Westport*, she will fish for Breast-O-Chicken out of San Diego. Launching ceremonies were held before a crowd of 600 San Diegans. The principal speaker was Representative Robert C. Wilson, who spoke on the measures being taken by Congress to assist the fishing industry to combat foreign imports. Mr. Harold Requa, of Breast-O-Chicken spoke of the value of these vessels to San Diego economy. Mmes. Robert W. McClure and M. J. Corn served as sponsor and matron of honor.

Waukesha Generator Sets



Waukesha Motor Company's latest development in the field of heavy-duty internal combustion engines and electrical equipment is their new line of industrial engine-generator sets with capacities of from 50 to 600 kw. The large range of Waukesha power units available permits accurately balanced engine and generator combinations in applications requiring a smooth, steady flow of power for continuous, intermittent, and stand-by duty.

Illustrated is a typical Waukesha 148-diesel series Industrial Enginotor set. This series is available in capacities from 50 to 120 continuous kw rating.

148 SERIES DIESEL ENGINOTOR CAPACITIES**—KILOWATTS

GEN- ERATOR MODEL (by rpm rating)	ENGINE MODELS 148-DKU, 148-DKBU, 148-DKBSU								
	STAND-BY KW			INTERMITTENT KW			CONTINUOUS KW		
	148- DKU	148- DKBU	148- DKBSU	148- DKU	148- DKBU	148- DKBSU	148- DKU	148- DKBU	148- DKBSU
1800	*	115	150	*	100	135	*	90	120
1200	85	85	†	80	80	†	70	70	†
900	65	65	†	60	60	†	50	50	†

*148-DKU cannot be operated at 1800 rpm.

**Ratings are corrected to standard conditions 29.92 Hg. Barometer and 60° F. Air Temperature.

†Model 148-DKBSU not practical to operate at 900 and 1200 rpm.

The capacities table shows the ratings available with various rpm generators and for standby intermittent, or continuous duty. The Waukesha 148-diesel is available as a normal diesel with standard crankshaft (148-DKU), a normal diesel with counterbalanced crankshaft (148-DKBU), or a turbo-supercharged diesel with counterbalanced crankshaft (148-DKBSU). The largest engine-generator set built by Waukesha is powered by the V-12 turbocharged Model VLRDBSU rated at over 1100 hp for continuous duty. Waukesha engine-generator sets, built for operation on gas, gasoline, or diesel fuels, are known by the name of Waukesha Enginotors.

Two New Products

The Dynamatic Division of Eaton Manufacturing Company announces that it has developed and can now offer its adjustable speed, fractional horse-

Competition for Time
is important...
and valuable too!



Competing for a man's reading time has become a major problem for every business paper today. More and more, men are finding that their reading time is being cut-up by increased pressures within their own office or job-site.

That is why these same men are constantly turning to **DIESEL PROGRESS**, the paper which offers them the most complete information presented in a way in which they can get the most for the least time invested.

Have you noticed the big detail-full illustrations and the easy to read type faces used throughout the editorial section? Just one way the reader saves his time, but doesn't fail to get the complete story which he needs so vitally.

Have you noticed, that most feature articles in **DIESEL PROGRESS** run no more than two facing pages? Research has proven that readership drops off rapidly when the reader has to turn the page and go hunting.

Providing the reader with all the information at hand—putting it in easy to read type—telling him the story with large and clear "show-all" illustrations continues to be the daily job of our editors every month.

When you put your sales story in the advertising pages, it is more apt to be seen, because more diesel men open and read **DIESEL PROGRESS** every month.

power, Ajusto-Spede Drives with integral electrically operated fail-safe friction brakes or integral speed reducers. Two brake ratings are available—18 and 36 pounds inches of torque. Speed reductions are available from 5:1 to 100:1, depending upon the drive horsepower rating.

The small single package drive is a combination of AC constant speed induction motor, eddy-current coupling and electronic control. Standard modifications include either the friction brake or speed reducer. A simple connection to a standard power line is the only wiring required. All drives have a continuous constant torque rating through a 25:1 speed range. Electronic control insures speed stability of plus or minus 2 per cent of top speed at any point within the operating range.

Fundamentals of operation, mechanical construction, capacities, torque curves, dimensions, and control are outlined in Dynamatic's Fractional Horsepower Ajusto-Spede Drive Bulletin. A free copy will be forwarded upon request to the Division's offices in Kenosha, Wisconsin.

Fork Lift Trucks

New precision power steering, automatic transmission, and positive-action hydraulic system are some of the advanced-design features announced for a new line of fork lift trucks by Towmotor Corporation, Cleveland, Ohio. Four new models make up the new Towmotor "Pace-Maker" Series. The new Fork lift trucks offer a wide range of lifting capacities from 6000 to 11,000 pounds in diesel units.

Plant officials seeking operating speed and load stacking efficiency will welcome the improved power steering mechanism available on all "Pace-Maker" models, regardless of the type of transmission, size of engine or capacity of truck selected. Towmotor Corporation makes power steering available as original equipment, on an optional basis. Or it may be installed after delivery at low cost. Towmotor's improved automatic transmission, called TowmoTorque Drive, is also available as standard equipment on any model in the series at the option of the user. The manufacturer claims TowmoTorque Drive responds to the operator's forward-or-reverse demands on a split second basis, with full automatic progression from a standstill to high speed. New developments in Towmotor creep control, permitting the operator to inch his truck slowly forward while maintaining maximum engine speed for lifting, have also been incorporated in the new design.

A number of other features offered in Towmotor's Pace-Maker series for the first time include: styling by a nationally-known industrial designer; new functional body design that provides greater driving comfort and easier accessibility to engine and parts; good maneuverability through improved construction features that contribute to outstanding truck balance, more positive operating control and dexterous load positioning; adjustable off-center seating to assure maximum visibility; new engines of increased power in diesel models. More detailed information on the new Pace-Maker Series Fork Lift Trucks is available from the manufacturer, Towmotor Corporation, 1226 East 152nd Street, Cleveland 10, Ohio.



Mobile diesel-electric field powered unit for operating rock crushers. Engine is Cooper-Bessemer type FW-6T diesel, 550 hp driving 385 kw generator, 440 volt, 3 phase, 60 cycle, for the Rogers Construction Company, Portland, Oregon.

Mobile Power Package

The use of a high output diesel engine for driving an electric generator provides several basic advantages of importance in mobile power service. First, it concentrates more power in a smaller package. Second, it delivers power with an unusual dependability and with low maintenance. The advantages of the high output diesel are illustrated by the service record of a mobile power unit now in use by the Rogers Construction Company of Portland, Oregon.

Rogers Construction's mobile generator unit supplies the field power to drive its portable rock crushers. The mobile generator is a 385 kw unit, 480 volt, 3 phase, 60 cycle. The generator is driven by a supercharged Cooper-Bessemer Type FW-6T

diesel engine rated 550 hp at 900 rpm. The combination of supercharging and the use of a relatively slow speed engine gains the basic advantages afforded by this type of unit. Supercharging develops higher cylinder pressures to net more hp per cu in. of engine displacement. Slower engine speeds by their very nature require relatively little maintenance.

On one skid are the engine, generator and radiator units, providing a complete, compact power package. Hauled on a rubber-tired trailer, the packaged mobile power plant can be hauled to any location where electric power is needed. On Rogers Construction's particular operations in powering rock crushers, the mobile engine-generator runs throughout the day at full 550 hp load. The field operation is crushing stone for road building and fill.



ALMOST EVERY HIGH-PERFORMANCE TUG BOAT YOU READ ABOUT IS BRIGGS EQUIPPED . . . here's another.

BRIGGS EQUIPPED KATHLEEN C. TRACY

DOING THE JOB OPERATORS require is the reason for the ever increasing number of Briggs installations.

GIVING HIGHEST DOLLAR-FOR-DOLLAR filtration value, with less upkeep and attention is the reason that both crew and management are agreed on Briggs performance.

A NEW BOOKLET devoted exclusively to marine filtration problems is yours for the asking. It will help you solve some of those time-consuming shut-down problems.



The engine room of the 1590 HP Diesel, Kathleen C. Tracy. Briggs CD type filter in center foreground.



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MAIL THE COUPON FOR YOUR COPY OF OUR NEW BOOKLET "WATER AND ABRASIVES REMOVAL FROM SEA GOING VESSELS" PLUS UP-TO-DATE MARINE DATA.



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Company

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Diesel Caboose Lighting Set

The Fairbanks-Morse Model 45 diesel engine is now available in a complete caboose lighting set designed to furnish ample undiminished power for lights, radio, refrigerator, electric range, and electric heating even when the caboose remains stationary for long periods of time. This compact, lightweight single

cylinder diesel generator is offered in two sizes with capacities of 3 kw and 6 kw at 80% power factor. The 3 kw unit is approximately 3 ft long 2½ ft high, and less than 2 ft wide; the 6 kw unit is only slightly larger.

The diesel engine is a constant speed 1800 rpm, 4 cycle unit which features full pressure lubrication throughout, re-

movable cylinder liner, roller crankshaft main bearings, valve-in-head construction, low cost pintle type injection nozzle, and full floating piston pin. The engine is arranged for hand starting, but a 12 volt electric starting system can be furnished. The Fairbanks-Morse ac generator is direct connected and permanently aligned. An electronic voltage regulator, with no moving parts, holds volt-

age variations within 5%. A special shock absorbing mounting for caboose service isolates the caboose from engine vibration, and cushions the diesel generating set from car shocks encountered in service. Units of this type have been operated in continuous service for over one year without shutdown.

Illustrated Bulletin

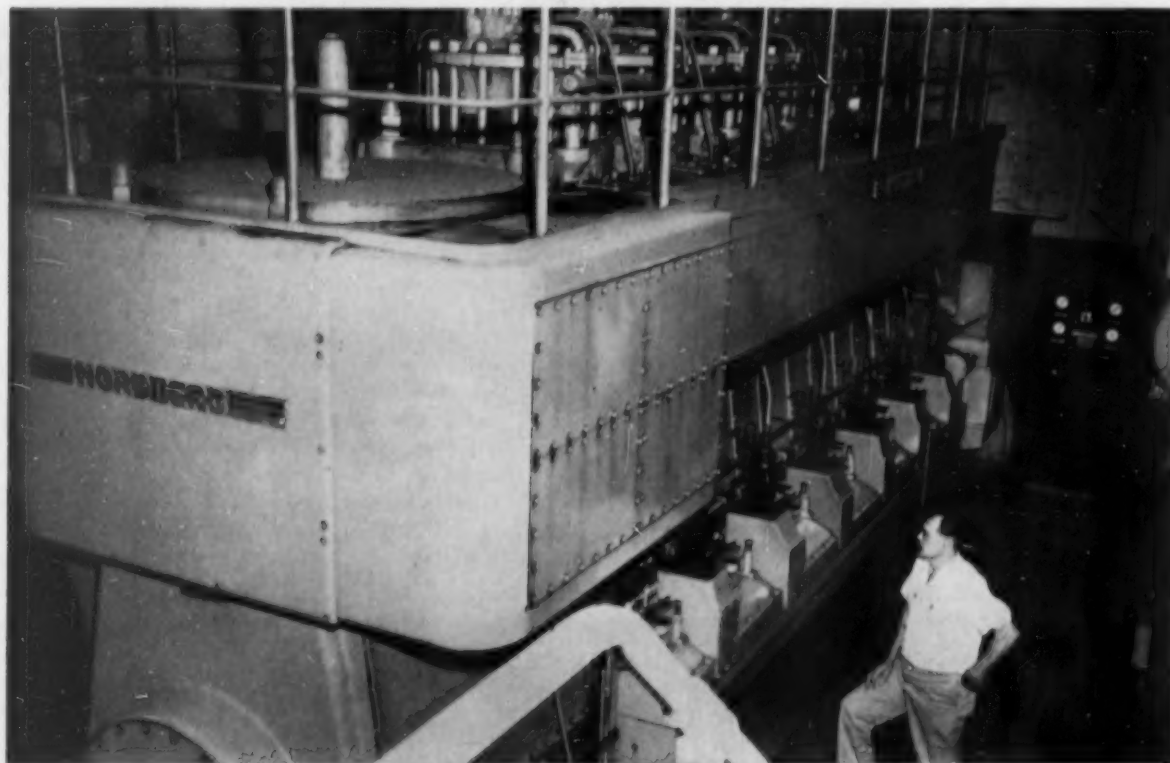
A new 4-page, 4-color illustrated bulletin (No. 9919) covering application of Gyrol Fluid Drives in the petroleum industry is now available from American Blower Corporation, Detroit 32, Michigan. The new bulletin describes the adjustable speed Gyrol units and outlines their features as applied to drilling rigs, pipe-line compressor stations, refineries and other petroleum industry applications. A cross-section drawing, which includes a flow diagram, illustrates the operation of the new Type VS, Class 2F unit which is described in detail in the new bulletin.

Among the specific installations discussed are draw works, rotary, slush pumps and compounding for drilling rigs; jacket water coolers, pumps and by-product reclamation for pipeline compressor stations; and catalytic reforming processes, centrifugal and positive displacement pumps and catalyst rejuvenators for refineries. Among other Gyrol Fluid Drive applications in the petroleum industry discussed in the new bulletin are mud reclamation, alternating current generator drives, and step-up gear protection.

Regional Manager

B. D. Fish has been appointed Regional Manager of Lister-Blackstone, Inc., a subsidiary of R. A. Lister & Co., Ltd., manufacturers of diesel engines. Mr. Fish first joined the Lister organization in 1934 which at that time was operating as Peet & Powers Co. He continued on with the company when it was incorporated as Lister-Blackstone, Inc. in 1939. In 1942 Mr. Fish went to Milwaukee when Lister engines were being built in that city. He has served as Chief Inspector, Quality Control Manager and Superintendent of the plant. He has made frequent trips to England to become familiar with the latest design and engineering procedures in the various Lister plants in Dursley, Stamford and Swindon. Mr. Fish continued with Lister-Blackstone, Inc., until 1952 when they transferred the distributorship of their engines in this country to National Supply Company, and he joined the National organization, later acquired by White Diesel Engine Division. There he worked at their New York District office and as Branch Manager for the New England area.

Look to COOK for Better Rings!



Cook rings save \$18 per day on one 2400-hp Diesel engine

WHEN a switch was made to Cook Piston Rings, Key West Electric's No. 12 Diesel showed a saving of \$41,670, for 55,542 operating hours — an average saving of \$18 per day!

There are good, built-into-the-ring reasons why a switch to Cook almost inevitably leads to more efficient performance, more dollar savings. Cook rings are re-turned as a final manufacturing process . . . they're light-tight, conform perfectly to the cylinder wall. This prevents scuffing and

power-stealing blow-by. Also, Cook rings are tensioned by a unique, gentle "squeezing" process. Result: constant, uniform tension that *never* wears out.

Get all the facts on this \$41,670 saving.

Get complete operating data showing exactly how Cook piston rings compared dollar-for-dollar with "X" brand rings. Write for the Key West Electric Story, C. Lee Cook Company, 992 South 8th Street, Louisville 3, Kentucky.



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COMPANY**

Rings and Packings Since 1888

Sales Conference

On April 17 the sales and engineering personnel of DeLuxe Products Corporation convened for a three-day conference at the LaPorte, Indiana headquarters of the company. R. K. Ruland, Sales Vice-President of the filter company reports that all phases of product engineering and development were covered in the conference, including the preliminary planning and discussion of contemplated new filters and cartridges for the DeLuxe line.

Immediate and future merchandising and advertising activities of the 31-year-old filter manufacturer were also on the meeting agenda as related to sales promotion of the company's products through its many original equipment and automotive wholesale accounts—including publication advertising, packaging, cataloging and general marketing plans.

New Exhaust Tubing

A permanently flexible, heavy-duty, vibration-absorbing, corrosion-resistant, stainless steel flexible exhaust tubing that is capable of withstanding constant exhaust temperatures up to 1250°F without damage, has been announced by Universal Metal Hose Company of Chicago. It will be available in two types: Type U-140-S stainless steel flexible tubing incorporates a soft copper wire packing which functions to plate the interlocking flexible tubing joints while in use to provide maximum flexibility under extreme vibration and high operating temperatures. Type U-120-S, also stainless steel flexible tubing, of similar construction to the U-140-S, does not have a copper wire packing, and therefore is lower in cost, yet highly efficient. Both types are fabricated from Chromium-Nickel 302 alloy steel and designed to provide long service life with greatly reduced exhaust line maintenance costs. Complete information may be had by

writing to Universal Metal Hose Company, 2133 South Kedzie Avenue, Chicago 23, Illinois.

Scraper Catalogs

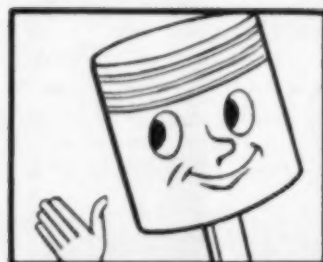
Euclid Division of General Motors has just published three catalogs describing the overhung engine line of Scrapers, Models S-7, S-12 and S-18. Each of the three-color catalogs contain 8 pages of cutaway views of major components and photographs that help to explain the accessibility and operating features. Condensed specifications are included to provide data on engines, transmissions, tires, scraper controls, weights and dimensions. These also show a performance table showing speeds and grade ability. Illustrations and action views show how hydraulic lever action of apron, bowl and ejector provides fast, independent control of all scraper operations. Except for one short length of cable on the apron lift, there are no sheaves, pulleys or cables.

Catalog 505 covers the S-7 Scraper which has a payload capacity of 7 cu yds struck, 8 yds at 3 to 1 slope, and 9 yds heaped at 1 to 1. The Model S-12, described in Form 506 carries 12 yds struck, 14 yds heaped at 3 to 1 and 16 yds at 1 to 1. Torqmatic Drive that consists of torque converter with semi-automatic transmission is a feature of the S-18 Scraper described in catalog 507. This power train eliminates manual shifting and permits changing from one speed range to another under full power. This model has an 18 yd capacity struck and rated payloads of 21 yds heaped at 3 to 1 and 25 yds at 1 to 1 slope. Copies of these catalogs are available from Euclid dealers or by writing Euclid Division, General Motors Corporation at Cleveland 17, Ohio.

New Towboat

Charles R. Poe, Marine Superintendent of Hutchinson Barge Line, Inc., has announced that his firm has placed an order with the St. Louis Shipbuilding & Steel Co. for an 1800 hp towboat, to be named the *Larry Turner*. To be delivered in November, the 124 ft by 33 ft twin screw towboat will be powered by a pair of General Motors 12-567 diesel engines. The *Larry Turner* is specially designed for Illinois River service with a unique retractable pilot house having a double telescoping hydraulic cylinder. From a minimum height of 15 ft 6 in. above the waterline, the pilot house will raise to 21 ft 6 in. and 29 ft 6 in. in two 8 ft lifts. This additional height will be particularly advantageous when used with the 870 ft Hutchinson oil tow. The *Larry Turner* named for the well known President of the Great Lakes Towing Co., will be the second St. Louis Ship towboat in the Hutchinson line.

CEMENT SHEATHS guard gulf wells



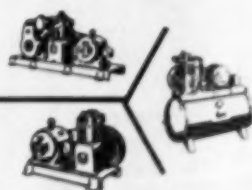
by Cecil Diesel
ROVING REPORTER

"For starting . . ." he goes on, "we've got two D-340 Quincy compressors—one forward, one in the engine room. Use them to operate cement discharge valves and air-over-hydraulic controls for the ship itself, too!"



Quincy has a compressor for your diesel starting job, too. Let them help you select the right model from a range of mountings and sizes—from 1 to 90 CFM. Write them for a catalog today.

Quincy
COMPRESSORS



PORT OF NEW ORLEANS—"What kind of ship is this?" I ask Skipper as the twin 270 HP Caterpillar marine diesels settle down to work. (I see another pair of Caterpillars, D3-18's, there in the engine room teamed with 40 KW generators.)



"This is one of the fleet of sea-going Halliburton cementing ships," he says. "Our deck tanks are filled with cementing materials. We're headed for some offshore oil drilling rigs, where we'll protect well casings with sheaths of cement. Pump it down as a liquid with power from three Cummins NHRBS 600 diesels."

QUINCY COMPRESSOR CO.
DEPT. K-50, QUINCY, ILLINOIS

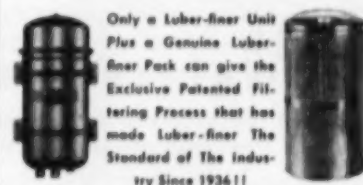
World's finest air compressors.

IT'S HERE! JUST OFF THE PRESS! Bigger, better, completely revised, rewritten and brought up to date. It's Volume 21 of DIESEL ENGINE CATALOG, now ready for mailing. Mail orders are now being filled for this giant reference book with its all-new, profusely illustrated engine and accessory sections. Orders are being accepted for this limited edition, which costs \$10 postpaid plus California sales tax where applicable. Send checks or company form orders to DIESEL PROGRESS, 816 N. La Cienega Blvd., Los Angeles 46, California.

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THERE'S A LUBER-FINER MODEL FOR EVERY TYPE OF ENGINE—EVERY TYPE OF OIL!

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Introduced to the public in 1935 for use with straight mineral oils, fuel oils, hydraulic oils, and inhibited industrial oils.

2. DIESELPACK

First made available in 1941, the DIESELPACK was primarily designed for use with H.D. detergent compounded oils and has also achieved outstanding results when used with fuel oils and straight mineral oils.

DON'T BE MISLED BY PRICE ALONE!

There is no substitute for DIESELPACK'S Patented Filtering Process for H.D. Compounded oils AT ANY PRICE!

The DIESELPACK cleans more oil faster—keeps it CLEAN longer—and gives more service and better engineered protection than ANY of the substitute filtering elements being offered for Lubber-finer units.

IT PAYS TO GET THE BEST!

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Assigned to New York Office



R. L. Spetka

The assignment of Richard L. Spetka to the New York domestic office has been announced by Robert F. Lay, vice-president and general sales manager of The Cooper-Bessemer Corporation, Mount Vernon, Ohio. Mr. Spetka will assist in the engineering and sale of compressors and engines. His activities will be carried out under the direction of Charles M. Reagle, vice president and district manager, and George W. Edick, branch manager.

A graduate of Ohio State University, Mr. Spetka is a registered professional engineer and has previously spent 3 years with the U.S. Army Corps of Engineers.

Piston Displacement Indicator



A new high-precision piston displacement indicator recently introduced in this country from Switzerland makes possible direct oscilloscope displays of engine pressure-volume diagrams. This instrument, which connects directly to the engine shaft, is electrostatic in nature. It functions according to an electrostatic charge on a precision ground variable capacitor. A standard Piezo-Calibrator

electrostatic amplifier is used to couple the sensor unit to the oscilloscope. This approach permits using the instrument for very slow engine speeds and to indicate static positions of the piston during calibration. The signal amplitude is independent of engine speed and a precision dial is provided to adjust the instrument to any cylinder.

Although the piston displacement indicator was developed for use with the high-precision SLM Quartz Pressure Indicator, it will operate in conjunction with any transducer. Any engine variable can be displayed as a function of piston displacement. For further information write to Kistler Instrument Company, 15 Webster Street, N. Tonawanda, New York.

National Torque Converters

Availability of National Supply Company's full line of heavy duty hydraulic torque converters for general industrial applications has been announced by M. E. Swaim, general manager of sales of the company. A new sales unit has been set up within the company to handle torque converters and other industrial products.

Until recently limited to use on oil field machinery and equipment, for which the company is best known, National single-stage torque converters are now being manufactured in a range of 100 to 1000 hp. This has been accomplished with six basic sizes which includes 17 power capacities in closely spaced ranges for exact matching with engines and electric motors. These power ranges are provided by modification of the converter hydraulic circuit. National torque converters can be mounted in any position. The unit illustrated, with cooling radiator for hydraulic fluid mounted on it, covers a power capacity range of 160 to 330 input hp at 900



rpm. Overall height of this unit is six ft from the bottom of the mounting pad under the output shaft to the top of the radiator.

Entry into other industrial fields was prompted by similar needs in other applications to engine-driven machinery. No limits have been set on applications of these torque converters. However, principal applications other than on well drilling rigs are expected to be for construction, excavating, earth-handling equipment and mining equipment.

National converters have been in use in the oil fields for three years during which many have gone into drilling rig service. Mr. Swaim said. He explained that the company decided to design and build its own torque converter when a need arose for larger and more rugged converters than were available. The company has had still longer experience with fluid couplings. These are manufactured in the company's Torrance, Calif., plant for oil field use. To meet the demand for its torque converters, new and improved manufacturing facilities have been set up at the National Supply plant in Toledo, Ohio. The three hydraulic elements—pump, turbine, and stator—are aluminum alloy castings. The precision required in fluid passageways and blade contours, which gives National converters a high efficiency in power transmission, has been assured by the development of a new manufacturing method.

Sales of torque converters, and other company products sold on a world-wide basis, will be headed by W. T. Cushing, Jr., Pittsburgh, who was recently appointed manager of industrial sales.

Diesel Tank Truck Fleet

Coastal Tank Lines, Inc., York, Pennsylvania, has purchased a new fleet of 45 Cummins Turbodiesel tractors, together with 70 trailers, in one of their largest expansion programs. The new equipment purchases include 45 White Motor Company 9000 TD's, with 175 hp JT-6-B Cummins Turbodiesels.

The company operates in 19 States and the District of Columbia, including Pennsylvania, Connecticut, Delaware, Illinois, Indiana, Kentucky, Maryland, Massachusetts, Michigan, New Jersey, New York, North Carolina, Ohio, Rhode Island, South Caro-

Diesel Shrimper



Recently launched and already shrimping, is the shrimp trawler, *Matilda Marie*. It was designed by Tams and built by Diesel Engine Sales Co. of St. Augustine, Fla. The 67 ft. by 18 ft. craft is of wood construction and was a complete "package unit," which is popular with Gulf fishermen. The *Matilda Marie* is owned by the D&S Seafoods of Tampa, Florida. It is powered with a 6-110 General Motors diesel supplied by Florida Diesel Engine Sales in Jacksonville, driving through 4.5:1 Allison reduction gears and turning a 50 in. by 44 in. five-blade Columbian propeller; the power take-off was made by the Rockford Clutch Div., Borg-Warner. It has Delco Remy starters and generators, Goulds pump and Surrrette batteries. Speed on the trial runs was 11 knots.

lina, Tennessee, Virginia, West Virginia, and Wisconsin. Its terminals and stations are scattered strategically throughout the operating area.

R. L. Green, Coastal's Operations Manager, at the company's headquarters in York, reports: "We have found that because of the increased horsepower afforded by the Cummins Turbodiesels, and their roadability, the new Whites have reduced driving time, in some cases as much as 40 minutes in a six-hour run, by maintaining a higher average road speed. This makes for more efficient operation and economy, even in the mountainous terrain of Western Pennsylvania."



AMOT SAFETY CONTROL



AMOT Model 1476-47 automatically shuts down engine on high water temperature or low lube oil pressure. Features are:

1. No capillary tube and bulb used.
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4. Will operate an air whistle.
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6. Will operate as a fuel shut-off valve.
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Write for Bulletin No. 223

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Equipment for Tubular Train

When the Pennsylvania Railroad's new stainless steel tubular train built by the Budd Company goes into service, its head-end power car will be equipped with electrical apparatus, engineered and supplied by the Westinghouse Electric Corporation. The generators and distribution apparatus occupy about two-thirds of the head-end power car which provides electricity for ventilation, air conditioning, heating, lighting, cooking, and other services. The remainder of the car houses the train's kitchen, where food is prepared for service to passengers in their seats.

The prime movers are two 1800 rpm Cummins diesel engines complete with starting equipment. Each Cummins engine drives an ac generator rated at 250 kw, three-phase, 60 cycle and 480 volts. The generators are separately excited by frame mounted belt-driven exciters. The exciter field is controlled by a voltage regulator. The application of ac generators in the power car, and the use of ac motors throughout the train eliminates commutators, a possible source of maintenance difficulties. Also, there is no need for a rotating conversion device on each car, to provide ac for fluorescent lighting and utility outlets. Elimination of axle generator drives and large batteries affords two advantages: (1) no power failure or maintenance of these items and; (2) no parasitic drag resulting in more locomotive power traction. Micarta plastic laminate is used to line wainscoting, pier panels, bulkheads, and ceilings of the interiors of the seven two-level passenger cars. Studies leading to the development of the tubular train were initiated by a committee for the study of lightweight passenger equipment, consisting of representatives of six cooperating railroads of which the Pennsylvania Railroad participated.

Power Take-Offs Bulletin

Publication of a new and comprehensive bulletin on its complete line of friction power take-offs has been announced by Twin Disc Clutch Company, Racine, Wisconsin. The new bulletin provides horsepower and torque capacities, side pull limitations, and dimensions for all Twin Disc power take-off clutches. Included is the latest information on Twin Disc's SP type power take-offs, which are designed especially for today's high-speed, high-output industrial engines. The SP line is currently available in Models SP-111, SP-114, SP-211, SP-214, SP-314, SP-318 and SP-321, ranging respectively from 95 to 602 hp in capacity. The new publication is available on request by writing for Bulletin No. 308, Twin Disc Clutch Company, Racine, Wisconsin.

Ground Support Units

Consolidated Diesel Electric Corporation has been awarded a contract exceeding \$9 million for multi-purpose ground support units for the Department of Defense. The announcement was made by Norman I. Schaffer, president. The units, Consolidated Diesel's MA-2, are self-propelled, and furnish electrical

support, air servicing, air starting of main engines and towing for latest model Century series jet aircraft, such as the F-100.

Initial deliveries of the MA-2 to the Air Force will begin in September and continue over a 12-month period, according to Mr. Schaffer. The contract includes maintenance tools, test equipment and

spare parts for the ground support units. The MA-2 was developed by Consolidated Diesel for service in all climates and under all operating conditions. It can be started and operated at minus 65 degrees Fahrenheit and at plus 130 degrees, from elevations at sea level to 6,000 ft. Each unit consists of a reciprocating engine, direct current generator, alternating current generator of the indus-



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trial self-cooled type, industrial four-stage reciprocating compressor, and gas turbine compressor. A single engine powers the generators and drives the servicing unit in two or four-wheel drive. The Air Force version of the MA-2 is similar to a commercial model developed by Consolidated Diesel for use with jet aircraft now on order by the nation's leading airlines.

Management Changes

International Harvester Company has announced the following management changes in advertising and sales promotion activities: Michael F. Peckels, former manager of the consumer relations department, was named director of consumer relations. He will be responsible for the operation of the sales operation

research and the consumer relations departments, as well as for the operator manual and parts catalog functions. Peckels, who joined Harvester in 1915, has served in manufacturing, engineering and sales positions. He was assigned to the general office in 1942, became assistant manager of consumer relations in 1944, was promoted to manager in 1945. In addition to his responsibilities at

Harvester he is also a director of the Association of National Advertisers.

William O. Maxwell, formerly assistant manager of the consumer relations department, was promoted to manager of the department. Maxwell came to Harvester in 1941 as a general assistant to the supervisor of advertising, after being in advertising agency work. He held several positions in advertising, sales promotion and merchandising, and also was manager of merchandising services for Harvester's foreign operations department, before his promotion to assistant manager of the consumer relations department in July, 1946.

Exhaust System

A new method of installing exhaust systems on diesel engines saves installation time, according to the manufacturer. Hopkins patented systems can be installed in field or shop without welding. The exhaust swivels eliminate stress from engine vibration and simplify fitting-up work. Although parts of the Hopkins exhausts have been in use for some time by fleet truck owners and industrial plants, the complete systems were not announced until every part had been tested on the job for 250,000 miles on trucks or two years on stationary engines. The Rocket-Clad joints have a special formula nickel case which resists burning out and only the parts most subjected need be replaced. Hopkins mufflers and the completed systems are listed in the new Hopkins catalog. The Hopkins continuing program of research, development and job-testing includes several other kits and systems to be made available soon. For more information contact American Products Co., 1532 S.E. 3rd, Portland 14, Oregon.

Water Treatment Plant Increases Capacity

Worthington Corporation has been awarded a contract for the fifth diesel engine-driven pumping unit in Miami, Florida's Alexander Orr Jr. Water Treatment Plant which will boost the plant's total capacity from 60 to 85 million gallons per day. The new unit is a 25 mgd unit while the existing four pumps are each rated at 15 mgd. The new unit consists of a Worthington SW 14-6, 1500 hp supercharged diesel engine driving a Worthington 20LC-4 centrifugal pump through a Worthington 28 in. by 14 in. double helical speed increasing gear. This new award makes the tenth Worthington engine to be purchased by the Water & Sewer Board of the City of Miami. Five of these are engine-driven blower and generator units presently installed at the City's Sewage Treatment Plant on Virginia Key.

DIESEL ENGINE CATALOG

Volume 21

**YOUR COPY OF VOLUME 21, DIESEL ENGINE CATALOG
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ADVERTISERS' INDEX

Allis-Chalmers Mfg. Co. Buda Division	12	Eaton Manufacturing Co.	61	Morco, Inc.	69
American Bosch Division American Bosch Arma Corp.	18-19	Electric Machinery Mfg. Co.	6-7	Murray & Tregurtha, Inc.	71
Amot Controls Corp.	77	Electro-Motive Div., General Motors Corp.	16-17	Napier & Son, Ltd., D.	58
Brad Foote Gear Works, Inc.	64	Engine Life Products Corp.	70	National Metal & Steel Corp.	80
Briggs Filtration Co., The	73	Enterprise Engine & Machinery Co.	8	Nordberg Mfg. Co.	4
Brodie System, Inc.	77	Eric Forge & Steel Corp.	10	Purolator Products, Inc.	5
Buda Div., Allis-Chalmers Mfg. Co.	12	Fairbanks, Morse & Co.	14-15	Quincy Compressor Co.	75
C. A. V. Ltd.	55	Fram Corporation	13	Schneider Bros. Co.	62
Cleveland Diesel Engine Div., General Motors Corp.	66	Garrett Corporation, The (AiResearch Industrial Div.)	2	Schoonmaker Co., A. G.	76
Cook Company, C. Lee	74	General Motors Corporation Cleveland Diesel Engine Div.	66	Sebastian Diesel Equipment Co.	76
Cooper-Bessemer Corp.	Fourth Cover	Delco-Remy Div.	20-21	Standard Oil Co. of California	9
Curtiss-Wright Corp., Marquette Metal Products Div.	59	Detroit Diesel Engine Div.	22-23	Standard Oil Co. (Indiana)	24
DeLaval Separator Co., The	65	Electro-Motive Div.	16-17	Stratoflex, Inc.	68
DeLaval Steam Turbine Co.	Third Cover	Hercules Motors Corp.	63	Sturtevant Co., P. A.	76
Delco-Remy Div., General Motors Corp.	20-21	Interstate Diesel Service, Inc.	76	Texas Co., The	Second Cover-1
Detroit Diesel Engine Div., General Motors Corp.	22-23	Lane Plating Works	76	Thomas Flexible Coupling Co.	53
Diesel Parts And Service, Inc.	80	Luber-Finer, Inc.	75	Twin Disc Clutch Co.	11
		Marquette Metal Products Div., Curtiss-Wright Corp.	59	Vapor Blast Manufacturing Co.	67
		Mercoid Corp., The	64	Young Radiator Co.	57

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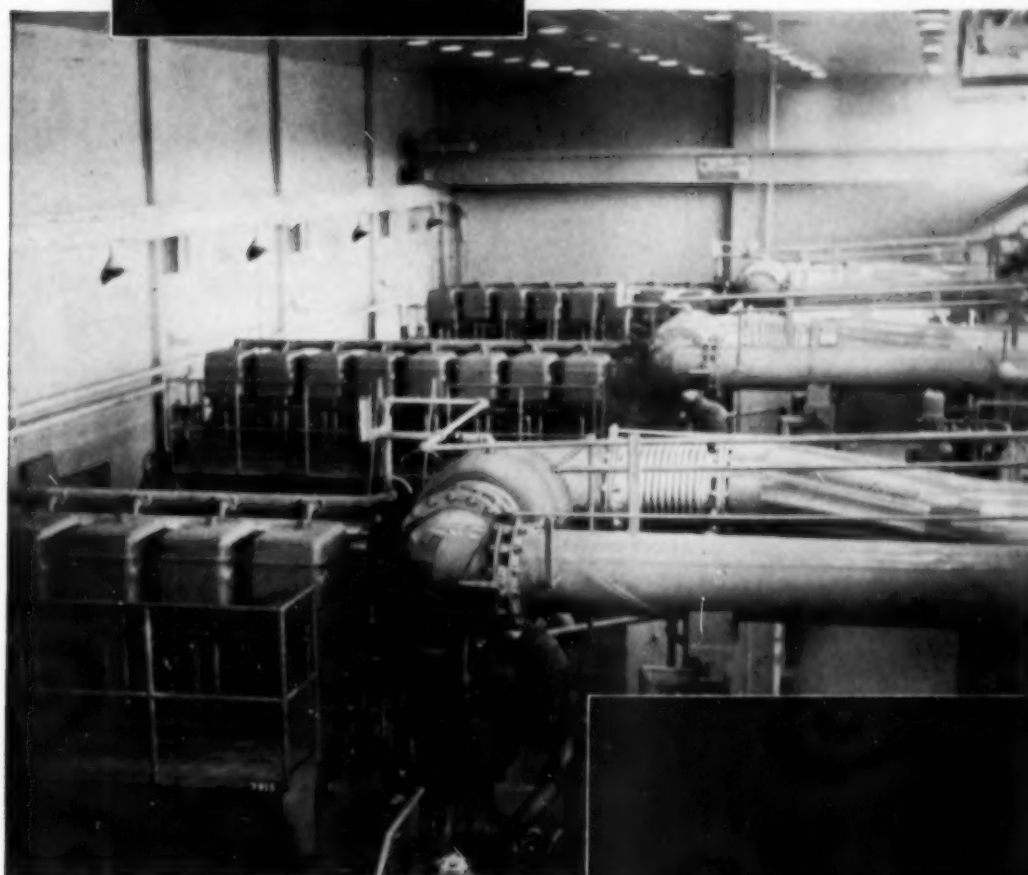
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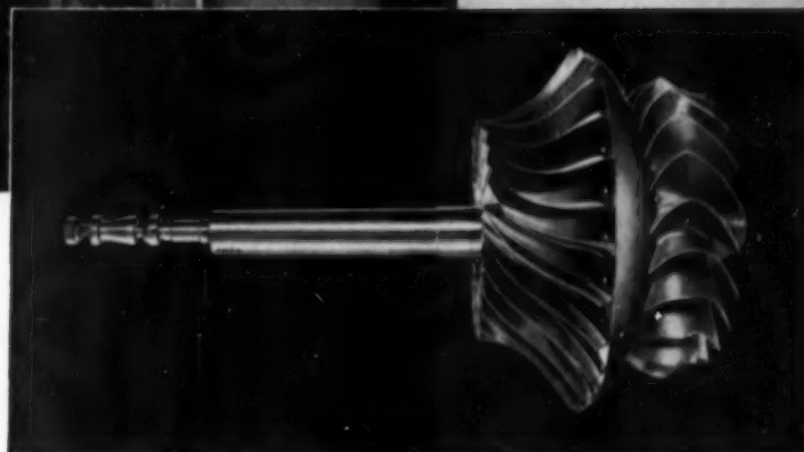
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Located in an outlying district in Northern Minnesota, this oil pumping station of the Lakehead Pipe Line Company must have *dependable, efficient* equipment. That's why Nordberg Diesel engines with *De Laval High Pressure Turbochargers* were chosen for this service.

The De Laval turbochargers efficiently utilize the exhaust gases to supply the high intake air requirements of these 1800 BHP, eight cylinder, four-cycle Supairthermal engines. Shown in the photograph are three units. Six other identical engines operate in pairs in three other stations of this company.

Due to the exclusive Monorotor design, De Laval High Pressure Turbochargers have a pressure ratio up to 3:1, as well as far higher pressure and turbine efficiencies than those found in conventional turbocharger systems. They are self-adjusting to engine loads, can be used with 4- and 2-cycle engines.

Write for De Laval Bulletin 8000 giving comprehensive curves and flow range diagrams.



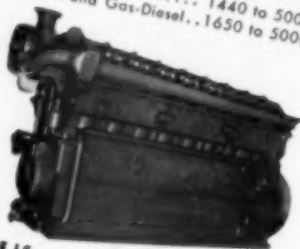
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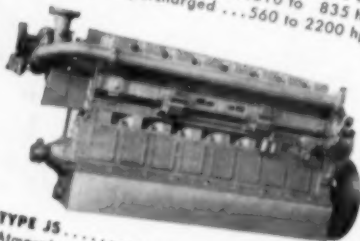
TYPE LSV 12 or 16 cyl.
Atmospheric and Supercharged
Gas 1440 to 5000 hp.
Diesel and Gas-Diesel... 1650 to 5000 hp.



TYPE LS 6, 7, 8 cyl.
Atmospheric and Supercharged
Gas 660 to 2500 hp.
Diesel and Gas-Diesel... 965 to 2500 hp.



TYPE FVA 6, 8, 12 or 16 cyl.
Diesel — Atmospheric 310 to 835 hp.
Diesel — Supercharged ... 560 to 2200 hp.



TYPE JS 5, 6, 7 or 8 cyl.
Atmospheric and Supercharged
Gas 325 to 1815 hp.
Diesel and Gas-Diesel... 430 to 1815 hp.



TYPE GS 5, 6 or 8 cyl.
Atmospheric and Supercharged
Gas 320 to 1460 hp.
Diesel and Gas Diesel ... 300 to 1460 hp.

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The standard units shown here are typical of the many "top performers" now offered by Cooper-Bessemer. With "Tri-Fuel" operation of most 4-cycle engines, and a new line of centrifugal compressors, Cooper-Bessemer continues to put into practice its policy of "Another Example of Efficient Power at Lower Cost".

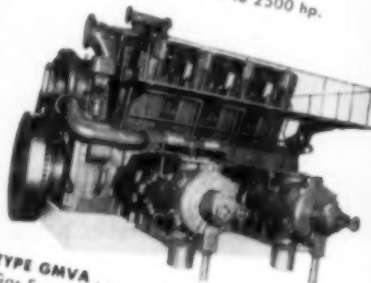
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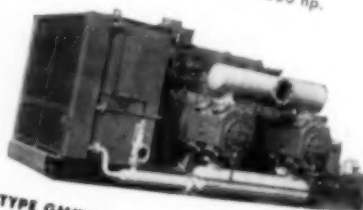


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